



Conformal Curing Oven

TC V3

Operations Manual

NOTICE

This is an Asymtek publication, which is protected by copyright. Original copyright date 2006. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Asymtek. The information contained in this publication is subject to change without notice.

Manuals on the Internet

For the convenience of Asymtek customers and field service representatives, copies of Asymtek manuals can be downloaded from:

<http://www.asymtek.com/support/manuals.htm>

Contact Us

Asymtek welcomes requests for information, comments, and inquiries about its products. Please contact us using the information below:

	
Headquarters	2762 Loker Avenue West Carlsbad, CA 92010-6603 USA
Toll Free:	1-800-ASYMTEK (1-800-279-6835)
Tel:	+1-760-431-1919
Fax:	+1-760-431-2678
E-mail:	info@asymtek.com
Website:	www.asymtek.com
Technical Support	
USA:	1-800-ASYMTEK (1-800-279-6835)
Other regions:	www.asymtek.com Tech Support

Trademarks

Asymtek® is a registered trademark of Asymtek.

Nordson Electronics Systems® is a registered trademark of Nordson Corporation.

Table of Contents

1	Introduction	1
	Overview	1
	Basic System Description.....	1
2	Safety.....	3
	Overview	3
	Facility Requirements.....	3
	Basic Safety Precautions and Practices	4
	Safety of Personnel	4
	Preventing Cure Module and Workpiece Damage.....	4
	Earthquake Precautions	5
	Personnel	5
	Movement.....	5
	Safety Warning Labels	5
	Emergency Shutdown	5
	Emergency Shutdown Recovery	5
	Lockout of Electrical Energy.....	6
	Interlock	6
3	Components	7
	Overview	7
	Safety First	7
	Standard Module Components	7
	Conveyor System	7
	Air Exhaust	8
	Heating System	8
	Reinforced Cooling System.....	9
	Software	9
	Light Beacon.....	10
	Optional Accessories.....	13
	Second Track Conveyor.....	13
	Heavy Duty Conveyor.....	13
	Automatic Conveyor Chain Lubrication	14
	Dropped Board Detection Cell.....	14
	Pin/Chain Conveyor 3 mm	15
	Board Counter Cell.....	15
	Exit Jam Detection Cell	15
4	Installation	17
	Overview	17
	Safety First	17
	Facility Requirements.....	17
	Unpacking and Placing the Cure Module.....	17
	Unpacking the Accessories	18
	Leveling the Cure Module	19
	Anchoring the Cure Module	20
	Connections	20
5	Operation	21
	Overview	21
	Safety First	21
	System Start-up.....	21
	System Shutdown	23
	Hood Opening/Closing Operation	24
	Hood Opening Procedure:.....	24

Hood Closing Procedure	25
Setting Conveyor Clearance	25
6 Software	27
Software Architecture	27
Main Menu	28
Tool Bar	28
Zone Graphic View	29
Recipe Menu	30
Recipe Management	34
Control Menu	35
Inputs/Outputs	38
Conveyor Parameters Modifications	41
Set Date and Time Procedure	43
Production Scheduling	45
Tactile Screen	47
Options Parameters Modifications	48
PLC Messages	49
Counters	50
Alarms	51
Resetting the Alarms	52

1 Introduction

This manual covers basic operations for the TC V3 Conformal Curing Oven. It is intended as a reference for production operators, process engineers, service technicians, and persons unfamiliar with Asymtek products.

Overview

This manual consists of the following sections:

- [Safety](#)
- [Components](#)
- [Installation](#)
- [Operation](#)
- [Software](#)

Basic System Description

The main features of the TC V3 Cure Module are:

- Five oven lengths (3.2, 3.8, 4.4, 5.6, and 7.4 m)
- Top and bottom radiant panel heating system
- Bottom extraction (TC 2400, TC 3000, TC 3600)
- Top blowing and bottom extraction (TC 4800, TC 6600)
- 400 mm loading and unloading zone
- Chain conveyor

2 Safety

Overview

Operation of the TC V3 Conformal Curing Oven involves heat, electrical power, mechanical devices, and the use of hazardous materials. It is essential that every person servicing or operating the Cure Module fully understands all hazards, risks, and safety precautions described in this section. When properly operated and maintained, the Cure Module should be safe and reliable.

This section is intended to provide basic safety information necessary for operating, maintaining, and servicing your TC V3 Cure Module. This section covers the following topics:

- [Facility Requirements](#)
- [Basic Safety Precautions and Practices](#)
- [Earthquake Precautions](#)
- [Safety Warning Labels](#)
- [Emergency Shutdown](#)
- [Lockout of Electrical Energy](#)

Use of this equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

To further optimize safe operation, maintenance, and servicing of the TC V3 Cure Module, precautions and recommended practices are included with the procedures throughout this manual.



WARNING!

Safety is considered a joint responsibility between the original equipment manufacturer and the end-user (owner). Safety precautions and practices should be in accordance with the governing laws and regulations, and facility requirements in addition to those recommended in this manual.



WARNING!



CAUTION!

Unsafe equipment conditions can result in personal injury or property damage. Failure to properly operate and maintain the Cure Module in accordance with this manual may jeopardize the built-in safety features.

Facility Requirements

To ensure optimal performance and safety, it is necessary to install the Cure Module in a facility that meets the necessary requirements. Refer to the [Installation](#) section of this manual for detailed instructions.

Basic Safety Precautions and Practices

The following precautions and practices are recommended during Cure Module operation and maintenance.

Safety of Personnel

- Only trained personnel should be permitted to perform operation, maintenance, service, and troubleshooting procedures.
- All personnel working on or near the Cure Module should know the location of all electrical power supply sources.
- Lock/tagout procedures must be performed before service or maintenance work is done on the Cure Module (see "[Lockout of Electrical Energy](#)" at the end of this section).
- Immediately push the red Emergency Off (**EMO**) button if personnel are in danger of being injured.
- If in a confined room, ensure adequate and uninterrupted air ventilation, heating, and cooling to meet environmental stress limits of personnel and the Cure Module.
- Follow MSDS recommendations for the proper handling, cleanup, storage, and disposal of hazardous materials. Know the MSDS recommendations for treatment of injury resulting from exposure to hazardous materials.

Preventing Cure Module and Workpiece Damage

- Immediately push the **EMO** button if the Cure Module or a workpiece is in danger of being damaged.
- Use standard Electrostatic Discharge (ESD) precautions when working near ESD-sensitive components. Always wear a grounding strap and connect it to the ESD ground before handling workpieces.
- Follow all recommended system maintenance procedures as outlined in the *Maintenance Manual*.
- Ensure that no air intake or exhaust grilles are blocked while the Cure Module is in operation.



WARNING!



CAUTION!

Failure to comply with any of the safety recommendations could cause serious injury to personnel and/or damage to the equipment.

Earthquake Precautions

In the event of an earthquake, the cure module must be secured to prevent movement that could cause injury to personnel and damage to the equipment and facility.

Personnel

To prevent injury during an earthquake, all personnel should follow facility earthquake safety guidelines.

Movement

The TC V3 Cure Module is structurally designed to withstand seismic activity in accordance with industry standards. To prevent system movement during an earthquake, each leveler (foot) should be anchored to the floor with two bolts. The anchor joint should be able to withstand at least 100 kg (220 lbs.) of pullout force. See "[Anchoring the Cure Module](#)" in the [Installation](#) Section.

Safety Warning Labels

Warning labels on your TC V3 Cure Module point out areas where personnel must use extreme caution to prevent injury or damage.



WARNING!



CAUTION!

Comply with all safety warning labels to prevent serious injury to personnel and/or damage to the equipment. Worn or damaged labels should be replaced with new labels having the same part number.

Emergency Shutdown

The TC V3 Cure Module features an **EMO** button that the operator or service technician can use to immediately halt all system operations in case of emergency. This feature helps prevent injury to personnel and damage to the Cure Module and workpieces being processed.

The **EMO** button is located on the front control panel of the cure module. The **EMO** cuts power to all system components.

Emergency Shutdown Recovery



WARNING!



CAUTION!

Do not restart the curing operation until the condition causing the emergency shutdown has been remedied. Failure to comply could cause serious injury to personnel and/or damage to the equipment.

To recover after an Emergency Shutdown:

1. Clear the Conveyor of all workpieces.
2. Lock out/tag out all system power. See "[Lockout of Electrical Energy](#)" at the end of this section.
3. Locate and remedy the cause of the emergency shutdown. If necessary, refer to the TC V3 *Maintenance Manual* for troubleshooting information.
4. Reset the main circuit breaker inside the electronics enclosure if it has been tripped.
5. Turn the red **EMO** button clockwise until it pops back into position.
6. Remove all warning tags and locking devices.
7. Restart the Cure Module. See "[System Start-up](#)" in the [Operation](#) section.
8. Wait at least 30 seconds then push the reset button. Failure to do so could cause problems with the motor speed controller.
9. Open the Alarm window and reset alarms on the PLC. See "[Resetting the Alarms](#)" in the [Software](#) section.
10. Click on the Start button on the Main Menu.
11. Wait for temperature stabilization before running production.



Figure 2-1 Reset Button

 **NOTE** The alarm will sound upon start up.

Lockout of Electrical Energy

TC V3 Cure Module electrical components have been designed in accordance with industry-wide safety standards. However, precautions must still be taken whenever personnel may be exposed to the unexpected power-up of the equipment or release of hazardous electrical, ultraviolet, or microwave energy. Lock out and tag out electrical power before performing service or maintenance work on the Cure Module.



WARNING!



CAUTION!

All personnel working on or near the Cure Module should know the location of all electrical power supply sources. Failure to follow lockout/tagout procedures could cause serious injury to personnel and/or damage to the equipment.

Interlock

The Interlock is an electronic connection that immediately cuts power to any motion and pneumatic actuators. If the hood or access doors are opened during production, the interlock is activated and all curing activity immediately stops to protect the operator from injury.

3 Components

Overview

This section provides a close look at standard equipment and optional accessories for your TC V3 Cure Module. This section covers the following components:

- [Standard Module Components](#)
- [Optional Accessories](#)

Safety First

Before operating or performing maintenance on any of the equipment described in this section, please review the important information provided in the [Safety](#) section.

Standard Module Components

Conveyor System

The Conveyor System moves items (PCBs, substrates, etc.) through the oven for thermal cycle processing (Figure 3-1). It is adjustable by a hand crank (see Figure 5-5 in the [Operation](#) section). Maximum product weight is 2 Km per meter.



CAUTION!

The correct operation of the conveyor is not guaranteed if the product weight is heavier than 2kg per meter. For heavier weight the "[Heavy Duty Conveyor](#)" option is available.

The conveyor is composed of:

- electrical motor
- speed sensor
- frequency controller in close loop
- transmission chain
- 2 main conveyor chains



Figure 3-1 Conveyor System

Air Exhaust

The oven is equipped with an Air Exhaust circuit that can be connected to the factory exhaust (Figure 3-2). During the curing process, varnish from the PCBs release heavy solvents. In order to avoid solvent accumulation, it is necessary to evacuate the air inside the oven.

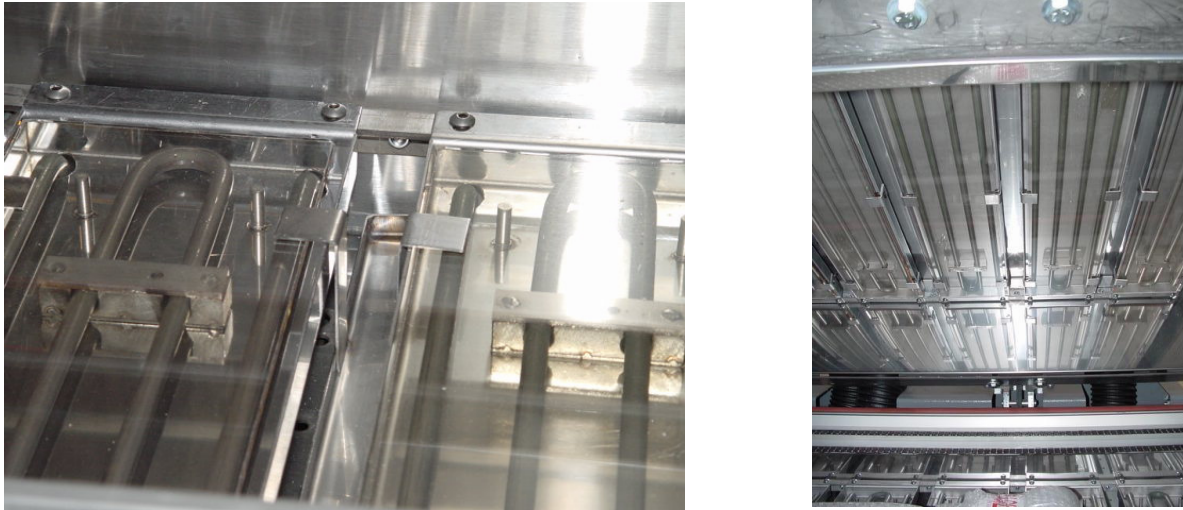


Figure 3-2 Air Exhaust

Heating System

The Heating System provides for the thermal cycle inside the oven. It includes six to ten zones, depending on the oven length, that can be set to the determined thermal cycle.

The heating mode is composed of 70% radiation and 30% convection. The heating system provides medium/long infrared radiation above and below the load. The heating tunnel is made up of resistors protected by vitro-ceramic glass plates. The temperature is controlled by a thermocouple (K type).

Reinforced Cooling System

The Reinforced Cooling System (Figure 3-3) blasts cold air through three directed-air knife fins by means of an integrated helical fan inside the oven frame. The hot air is pulled through the perforated plenum by an external fan (customer-supplied waste air exhaust).



Figure 3-3 Cooling System

Software

The Software control of the equipment is ensured by a complete SIEMENS PACKAGE (Figure 3-4) that has the following characteristics:

Industrial PLC SIEMENS CPU IM 151 / 315 2DP

- SIEMENS 5"7 TFT Display
- Industrial SIEMENS Modem (Option)
- Auto diagnostic
- On-line help
- Alarm log & historical log capability
- Instruction and alarm management
- Storage capacity > 100 files
- SMEMA interface
- CE Approval certification



Figure 3-4 SIEMENS Software

Light Beacon

The TC V3 Cure Module is equipped with a Light Beacon (Figure 3-5) that displays system status and can warn the operator when fault conditions exist. The Beacon displays colored lights (green, orange, and red) that can be solid or flashing, with an audible alarm capability to alert the operator of routine and urgent tasks that require attention.

 **NOTE** The alarm will sound automatically for certain conditions with action required for the red light alarm.

Table 3-1 Light Beacon Colors

Color	Condition
Green	Equipment running okay.
Orange	Oven is below defined temperature or conveyor speed needs stabilization.
Red	At least one alarm has been detected. Heat can be automatically switched off depending on the alarm.



Figure 3-5 Light Beacon

Alarm Conditions

The following table describes each type of alarm, cause, oven condition, and restart condition.

Table 3-2 Alarm Conditions

Type of Alarm	Cause	Oven Condition	Restart Condition
Speed Band Alarm	The difference between the measured speed and the requested speed is higher than the alarm speed defined in the r.	Heat and conveyor on Oven ready signal off Orange tower light on	When the measured speed is inside the defined band.
Low Speed Alarm	The measured speed is lower than the low speed limit defined in the recipe.	Conveyor on Heat off Oven ready signal off Red tower light on Alarm sounds	When the measured speed is higher than the low speed. Reset the alarm.
High Temperature Alarm 1	In any one zone the measured temperature is higher than 300 °C for longer than 3 min.	Conveyor on Heat off Oven ready signal off Red tower light on Alarm sounds	When the measured temperature is lower than 300 °C. Reset the alarm.
Temperature Band Alarm	In any one zone the measured temperature is outside of the authorized band defined in the recipe.	Heat and conveyor on Oven ready signal off Orange tower light on	When the measured temperature is inside the defined band. Reset the alarm
Thermocouple Short-Cut Alarm	There is not 10 °C of temperature elevation on one zone while more then 80% of the power is applied.	Conveyor on Heat off Oven ready signal off Red tower light on Alarm sounds	When a temperature elevation of 10 °C is achieved in the specified time (from 1 to 10 min. according to the oven). Reset the alarm.
Thermocouple Broken Alarm	Thermocouple is broken	Conveyor on Heat off Oven ready signal off Red tower light on Alarm sounds	When thermocouple is reconnected. Reset the alarm
Security Bar Alarm	The security bar is not in place within 15 seconds of opening the hood.	Red tower light on Alarm sounds	When security bar is positioned and installed alarm will stop.
Open Hood Alarm	The closed hood sensor is still detected after 15 sec of opening the hood.	Red tower light on Alarm sounds	Reset alarm.
Exhaust Alarm	The input exhaust OK is down.	Conveyor on Heating off Oven ready signal off Red tower light on Alarm sounds	When input exhaust OK changes to 1. Reset alarm.

Type of Alarm	Cause	Oven Condition	Restart Condition
Loss Conveyor Parameters Alarm	The conveyor parameters are lost.	Oven ready signal off Red tower light on Alarm sounds	When conveyor is recalibrated (refer to the <i>Maintenance Manual</i>)
PCB Spacing Length Inferior than PCB Hole Max Length Alarm	PCB spacing length inferior than PCB hole max length	Oven ready signal off Red tower light on Alarm sounds	When recipe parameters are adjusted. Reset alarm.
Dropped Board Alarm (option)	The dropped board sensor is activated	Heat and conveyor on Oven ready signal off Red tower light on Alarm sounds	When the input exhaust OK changes to 0. Reset alarm.
Board Jam Alarm (option)	The count sensor at the conveyor output is sealed longer than the maximum delay defined in option parameters menu.	Heat and conveyor on Oven ready signal off Red tower light on Alarm sounds	When the sensor is not activated. Reset alarm.
Input Transfer Alarm (option)	The delay between the "Send PCB" signal from the upstream machine and input board sensor on the oven is longer than the time defined in the option parameters menu.	Oven ready signal off Red tower light on Alarm sounds	Reset alarm.
Output Transfer Alarm (option)	During a delay, the "downstream ready" signal is down longer than the time defined in the parameters option menu.	Oven ready signal off Red tower light on Alarm sounds	Reset alarm.
Lubricator Alarm (option)	The conveyor chain lubrication oil level is below the minimum level.	Alarm message received Oven still in production	When oil level is raised.
Humidifier Alarm (option)	There is a change in humidity level.	Oven ready signal off Red tower light on Alarm sounds	When humidifier error signal decreases to 0. Reset alarm.

Optional Accessories

Second Track Conveyor

The Second Track Conveyor option doubles the production capacity (Figure 3-6). Adjustable width is identical for both conveyors:

- Minimum: 2 x 50 mm
- Maximum: 2 x 200 mm

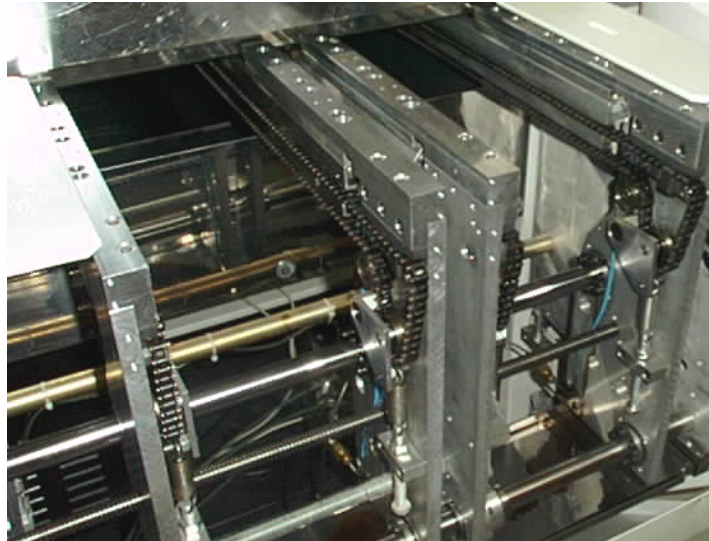


Figure 3-6 Second Track Conveyor

Heavy Duty Conveyor

The Heavy Duty Conveyor option is recommended for PCB or carrier weights over 2kg/m (Figure 3-7). Features include a special rail shape and a dual chain to transport PCBs or carriers.

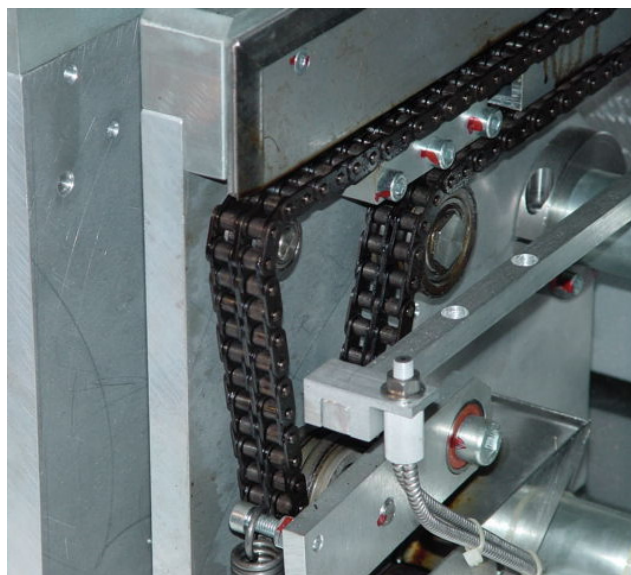


Figure 3-7 Heavy Duty Conveyor

Automatic Conveyor Chain Lubrication

An Automatic Conveyor Chain Lubrication option is available to ensure optimal chain lubrication (Figure 3-8). The lubrication module is located at the front of the cure module.



Figure 3-8 Automatic Chain Lubrication System

The lubrication oil tank and pump are built inside the cure module frame and ensure chain lubrication by a drip mode. The lubrication cycle (frequency and quantity) is controlled by PLC. When the tank is nearing empty a standard low level alarm will display.

Dropped Board Detection Cell

The Dropped Board Detection Cell is an optical cell that crosses the cure module from the input to the output of the conveyor (Figure 3-9). If a dropped board is detected, the heat will automatically stop and an alarm will sound.



NOTE This option is not available for TC 4800 and TC 6600 Cure Modules.

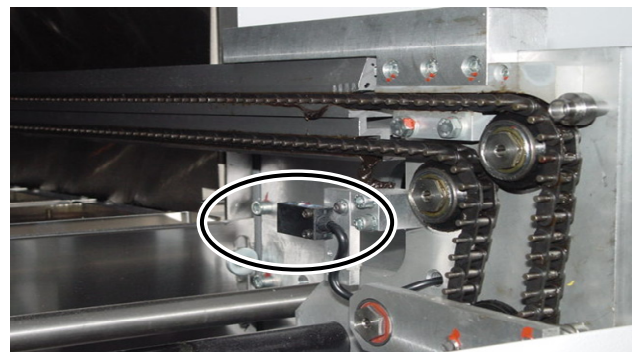
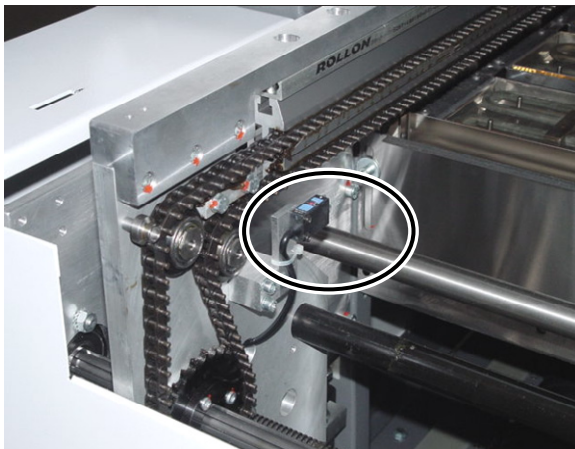


Figure 3-9 Dropped Board Detection Cell

Pin/Chain Conveyor 3 mm

The Pin/chain Conveyor length standard is 5 mm. A 3 mm length is available as an option (Figure 3-10). For safety reasons this option is available only for 3.2, 3.8, 4.4, and 5.6 m total length ovens.

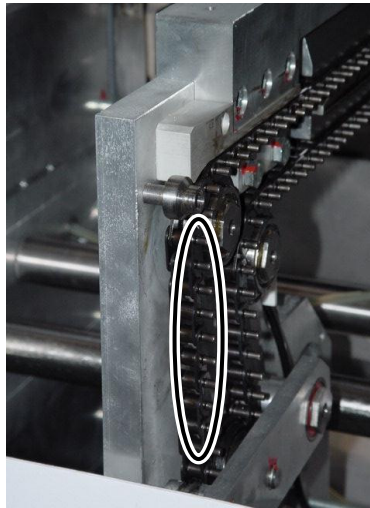


Figure 3-10 Pin/Chain Conveyor 3 mm

Board Counter Cell

The Board Counter Cell is an optical cell positioned to count the number of boards conveyed through the oven and to count total PCB production (Figure 3-11). Counter cells are located at the input and output of the oven.

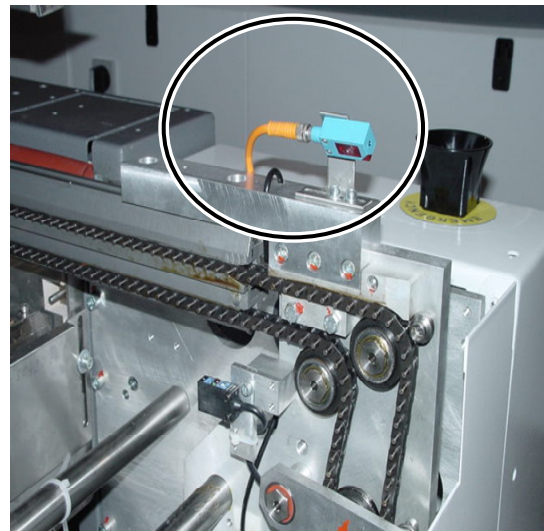


Figure 3-11 Board Counter Cell

Exit Jam Detection Cell

The Exit Jam Detection Cell is an optical fiber detection cell located at the output of the oven to detect potential board jams. This cell monitors the correct transition operation between the oven and the downstream machine using timing defined by the supervision software. If a jam is detected, the heat is turned off and an alarm will sound.

4 Installation

Overview

This section contains information necessary for the installation of the TC V3 Conformal Curing Oven.

- [Facility Requirements](#)
- [Unpacking and Placing the Cure Module](#)
- [Leveling the Cure Module](#)
- [Anchoring the Cure Module](#)
- [Connections](#)

Safety First

Before operating or performing maintenance on any of the equipment described in this section, please review the important information provided in the [Safety](#) section.

Facility Requirements

- The equipment should be installed in a location with enough light to allow all moving and fixed parts of the Cure Module to be illuminated correctly.
- The floor should be level and if possible covered with a non-flammable floor covering. See "[Leveling the Cure Module](#)" in this section.
- Adequate space must be provided around the Cure Module in order to facilitate maintenance operations.

Unpacking and Placing the Cure Module

To unpack and place the Cure Module:

1. If the Cure Module was shipped in a wooden crate, use a flat bar and hammer to remove the lid and sides of the crate.



WARNING!



CAUTION!

Personnel should wear gloves and safety glasses while removing the top and sides of the crate. Sufficient personnel should be used to lift and control the crate.

2. Remove all packaging material from the outside and inside of the Cure Module.
3. Remove any bolts and brackets securing the Cure Module to the pallet.
4. Use a forklift to gently lift the Cure Module off of the pallet.



NOTE

Lift the Cure Module from the very bottom, between the feet.

5. Place the Cure Module over the selected location where it will be operated, but DO NOT completely lower the forklift at this time.
6. Adjust the forklift height until the Cure Module is approximately at the height required to mate with upstream and downstream systems.
7. When the Cure Module is at the approximate mating height, adjust the levelers such that they are in contact with the floor.
8. When all four feet are equally in contact with the floor, gently lower the forklift blades.

Unpacking the Accessories

The accessories received will vary depending upon the configuration of your TC V3 Cure Module. These accessories may include UV lamps, power supplies, power cords, tool and maintenance kits, and equipment manuals. They may be in a crate, plastic wrapped on a skid, or secured to the Cure Module.

To Unpack the Accessories:

1. Locate the shipping list and place it in a safe location.
2. If the accessories were shipped in a wooden crate, use a flat bar and hammer to remove the crate lid.
3. As you uncrate or unwrap each item, identify it, and place a check mark next to the item name on the shipping list.
 - ▶ You may need to open the item in order to identify it. Once it has been identified, return the item to its original box or bag.
 - ▶ If any parts or accessories are missing, please contact Customer Service.



TIP

Place each item from the accessories crate onto a cart for easy transport. If possible, place the items next to the cure module onto which the items will be installed.

Leveling the Cure Module



CAUTION!

This procedure should only be performed by a trained service technician.



NOTE

If your Cure Module is going to be used as an in-line system, it needs to be leveled and aligned in relation to upstream and downstream systems. This manual does not include alignment procedures for upstream/downstream systems. Alignment procedures should be developed by your facility.

To level a stand-alone Cure Module:

1. Place the level in the center of the front conveyor rail, along the length of the rail.
2. Observe the position of the bubble within the level's window. The bubble should be centered indicating the Cure Module is level from side-to-side.
3. If necessary, adjust the Levelers (feet) as follows (Figure 4-1):
 - ▶ Loosen the locking nut.
 - ▶ Turn the Adjusting Nut in the desired direction until the level's bubble is centered, indicating that the system is level from side-to-side.

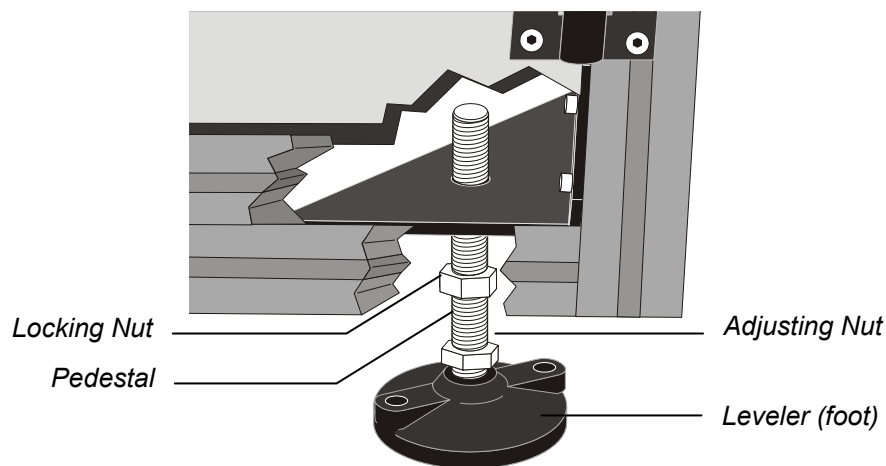


Figure 4-1 Leveler Height Adjustment

4. Check for all-around stability by putting your hands on top of the Cure Module in one corner and pressing down. If one leveler is lower or higher than the others, the Cure Module will rock back and forth. Adjust the levelers so that they are all bearing the weight equally.
5. Re-level the Cure Module from side-to-side and from front-to-back, if necessary.
6. Re-tighten the locking nuts on each foot after the machine has been completely leveled and stabilized.



NOTE

Do not over-tighten the locking nuts. They only need to be snug.

Anchoring the Cure Module

To prevent movement that could cause injury to personnel and damage to the equipment and facility, each leveler (foot) should be anchored to the floor with two bolts (Figure 4-2). The anchor joint (the point between each anchor bolt and the floor) must be able to withstand at least 220 lbs (100 kg) of pullout force.

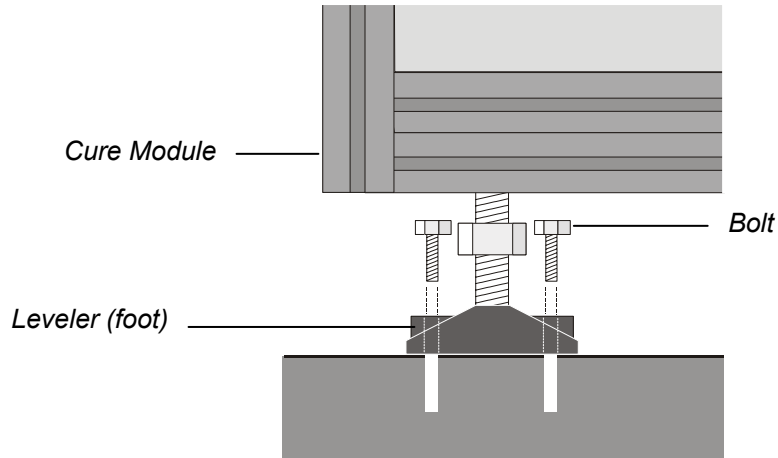


Figure 4-2 Anchoring the Cure Module

Connections

Connecting Power

The power supply line should be connected directly to the main circuit breaker located inside the electrical panel.

Connecting Exhaust

Connect the exhaust contact between Terminal 6C and 6A of the connector block XC1 inside the electrical cabinet.

5 Operation

Overview

This section covers the following topics:

- [System Start-up](#)
- [System Shutdown](#)
- [Hood Opening/Closing Operation](#)
- [Setting Conveyor Clearance](#)

Safety First

Before operating or performing maintenance on any of the equipment described in this section, please review the important information provided in the [Safety](#) section.

System Start-up



WARNING!

Initial start-up of the TC V3 Conformal Curing Oven should be performed by a trained service technician only to prevent damage to the equipment. Failure to do so could render the factory warranty null and void.

Before starting up the Cure Module check the following:

- Electrical network is compatible with the cure module design
- Main circuit breaker is in the neutral position
- Correspondence of phases (for first use)
- Exhaust connections



NOTE

When first operating the Cure Module, check the proper rotation of the oven blower, exhaust blower, and hood blowers.

To start the Cure Module:

1. Connect the Cure Module's main power cord to the facility power source.
2. Connect the SMEMA cables to the connectors on the rear panel of the Cure Module.
3. If the Cure Module was locked out for servicing, make sure that any locks and any tags have been removed.
4. Switch **ON** the facility power.
5. Verify that all doors are properly closed to prevent an Interlock condition. See "Interlock" in the [Safety](#) section

6. Make sure the **EMO** button (Figure 5-1) is not activated. If necessary, reset it by turning it clockwise until the button pops out.
7. Turn the power on by moving the Main Switch to the **ON** position.
 - ▶ When the Cure Module power is turned on, the programmable logic controller (PLC) initializes without any operator intervention. When the PLC has initialized, the control software automatically starts. The Main Menu appears.
8. Press the Reset button at the output of the oven (Figure 5-1).



Figure 5-1 EMO Button / Reset Button

System Shutdown

Emergency Shutdown

In case of emergency, use the **EMO** button to stop all system operations. The **EMO** button is the large red button on the operator's control panel. Refer to "Emergency Shutdown" in the [Safety](#) section for detailed information and reset procedures.

Normal Shutdown



WARNING!

Make sure the production run is complete, the conveyor has stopped, and there are no PCBs remaining in the oven before turning the equipment off.

Check the PCB Counter that there are no PCBs left in the oven. From the Main Menu, click on the **Stop** button to stop the heat and conveyor movement (Figure 5-2).

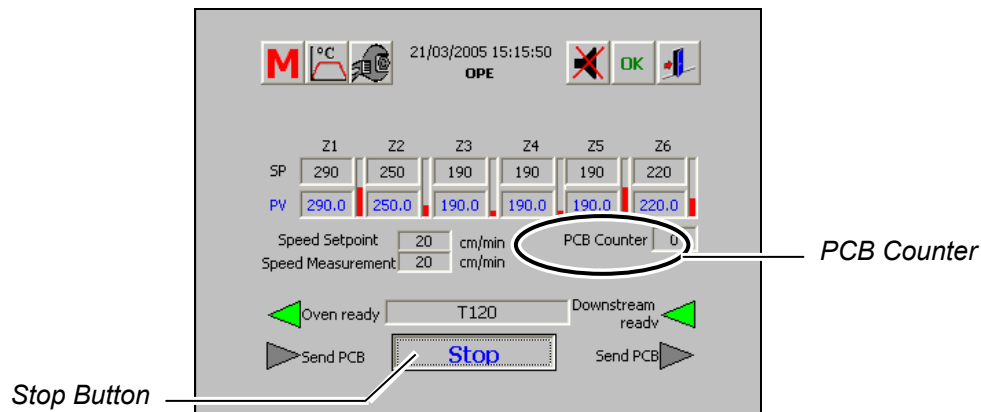


Figure 5-2 Main Menu



WARNING!

If the equipment will be turned off for an extended period of time (more than one month), make sure all preventive maintenance measures have been performed as outlined in the *Maintenance Manual*.

Hood Opening/Closing Operation

Hood Opening Procedure:

1. Check that the oven is clear of all PCBs before opening the hood.
2. To open the hood, turn the two switches on the front panel one turn simultaneously (Figure 5-3). This will automatically stop the heat and conveyor.



Figure 5-3 Hood Opening

3. The Hood will open automatically. Wait for the hood to open to maximum position.
4. Position the Safety Locking Bar (Figure 5-4). When opening the Hood, a Safety Locking Bar must be placed between the frame and the hood. A photoelectric sensor detects the presence of the safety bar. If the bar is not in place, the alarm will keep sounding until it is installed. Twenty seconds is allowed to put the bar in place, or to remove it when closing the Hood.



Figure 5-4 Hood Safety Locking Bar



WARNING!

Before performing any procedure, position and install the safety locking bar to hold the Hood in the open position. Failure to do so may result in serious personal injury and damage to the equipment.

Hood Closing Procedure

- Remove the safety pin to unlock and remove the bar.
- Turn the two switches (Figure 5-3) at the same time until the alarm rings. This indicates that the Hood is closed.

Setting Conveyor Clearance

To allow various board widths to be handled, the Cure Module is equipped with a conveyor system of variable widths. The width adjustment Hand Crank of the conveyor is located on the front of the Cure Module (Figure 5-5). Verify that the crank is placed in the opening labeled "CONVEYOR". Turn the crank to move the adjustable rail to modify the rail width.



Figure 5-5 Hand Crank



WARNING!

Make sure that the oven is clear of all PCBs before adjusting conveyor width. Failure to do so could cause damage to the equipment or workpieces.



NOTE

For nitrogen based systems the Cure Module is equipped with curtains to limit the consumption of nitrogen. The clearance of the rail can vary depending on the configuration.



CAUTION!

During production, the crank should be disengaged to prevent movement.

6 Software

This section will cover basic software operation for the TC V3 Conformal Curing Oven.

Topics included are:

- Software Architecture
- Main Menu
- Recipe Menu
- Control Menu
- Alarms

Software Architecture

The following graphic (Figure 6-1) represents the software architecture.

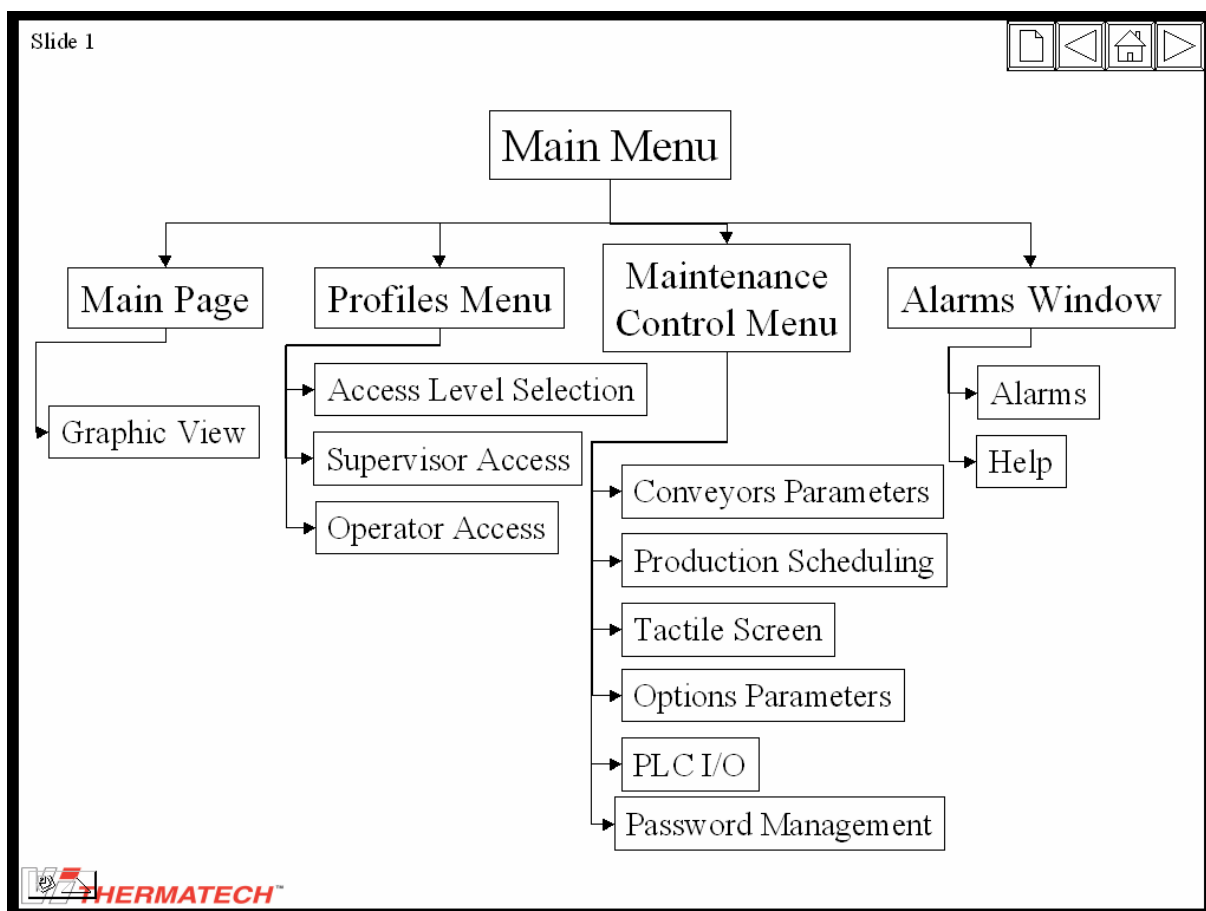


Figure 6-1 Software Architecture

Main Menu

When the machine is turned on, the Main Menu (Figure 6-2) appears:

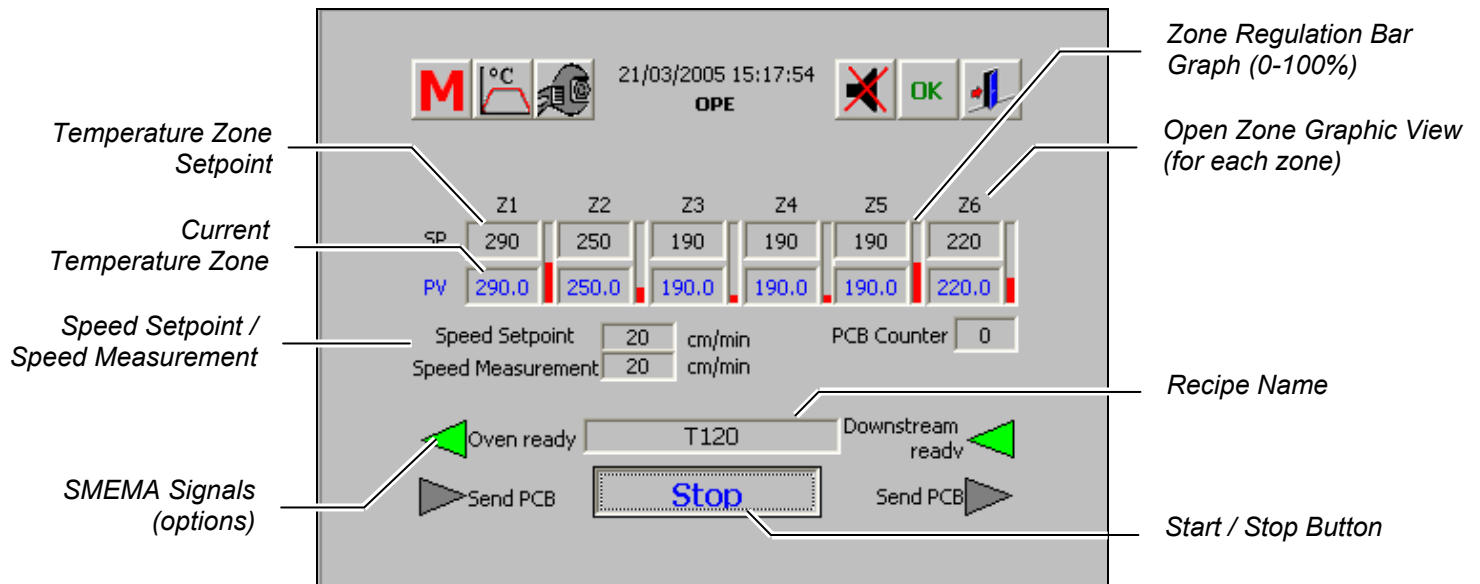


Figure 6-2 Main Menu

Tool Bar

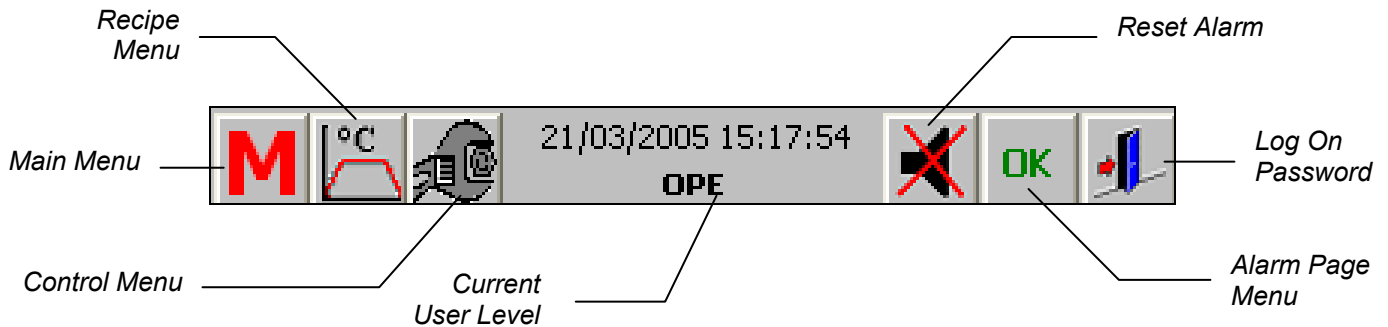


Figure 6-3 Tool Bar

Zone Graphic View

From the Main Menu, click on a **Zone Name** (Figure 6-4) to view zone settings, including a graphic evolution of the current zone temperature, the regulation percent, and the setpoint temperature (Figure 6-5).

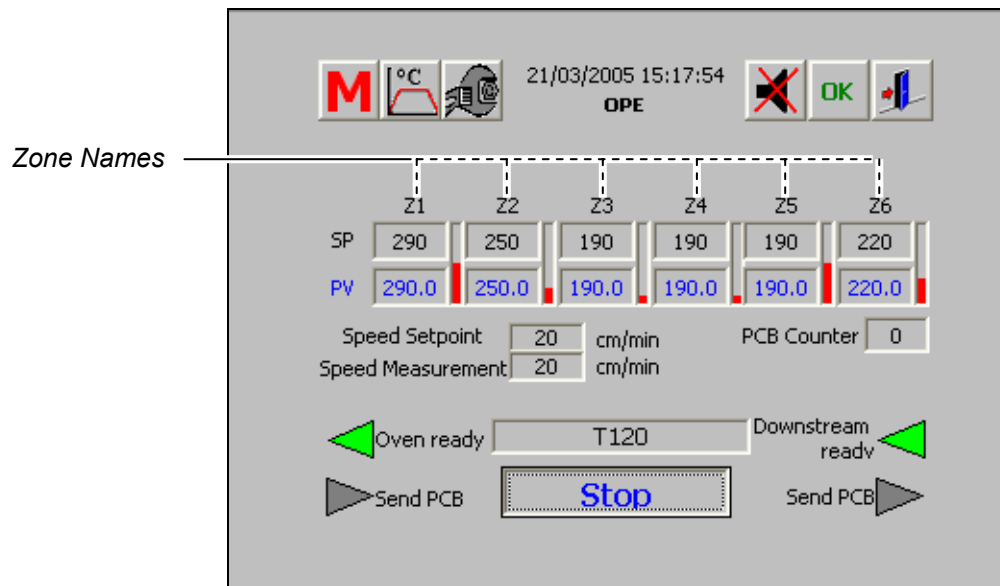


Figure 6-4 Main Menu - Zone Name Location

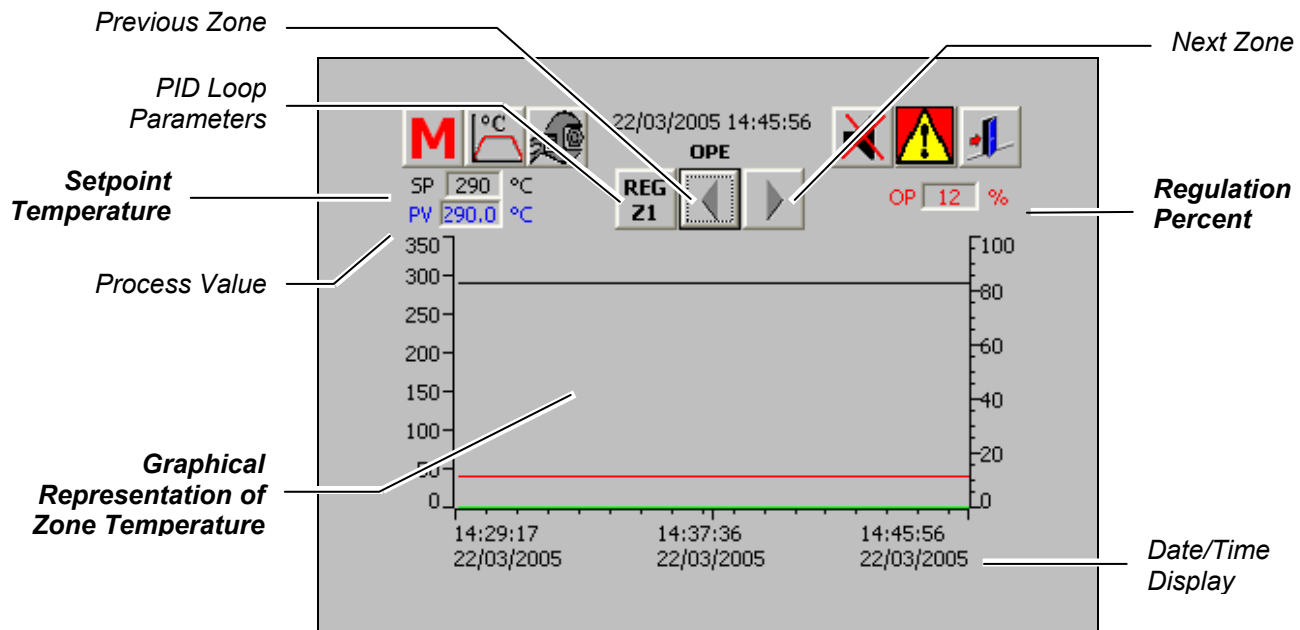


Figure 6-5 Zone Settings

Recipe Menu

1. To download multiple recipes, from the Main Menu click on the **Recipe Menu** button (Figure 6-6).

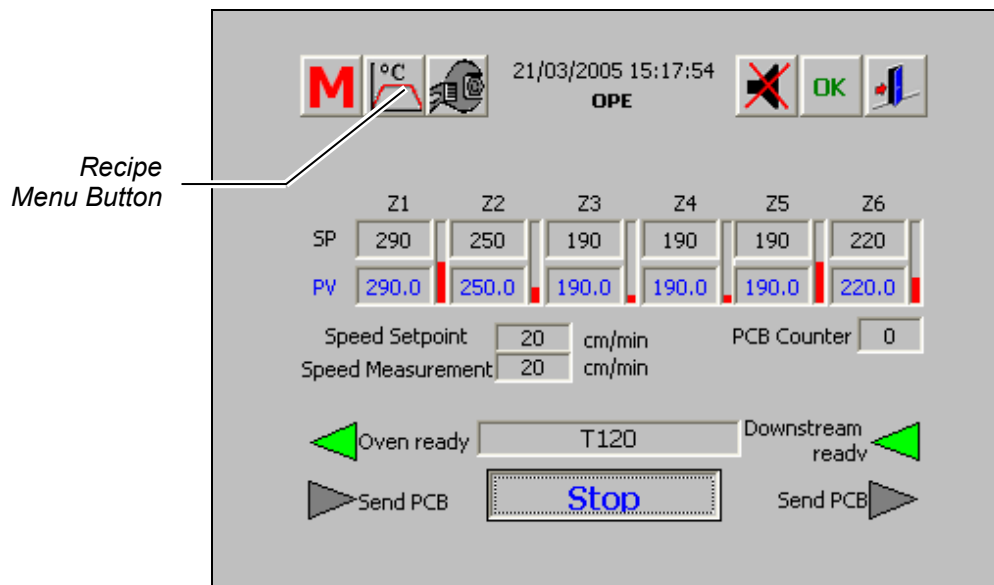


Figure 6-6 Main Menu

2. The Access Level Selection screen appears. Click on the **Operator Mode** button (Figure 6-7).

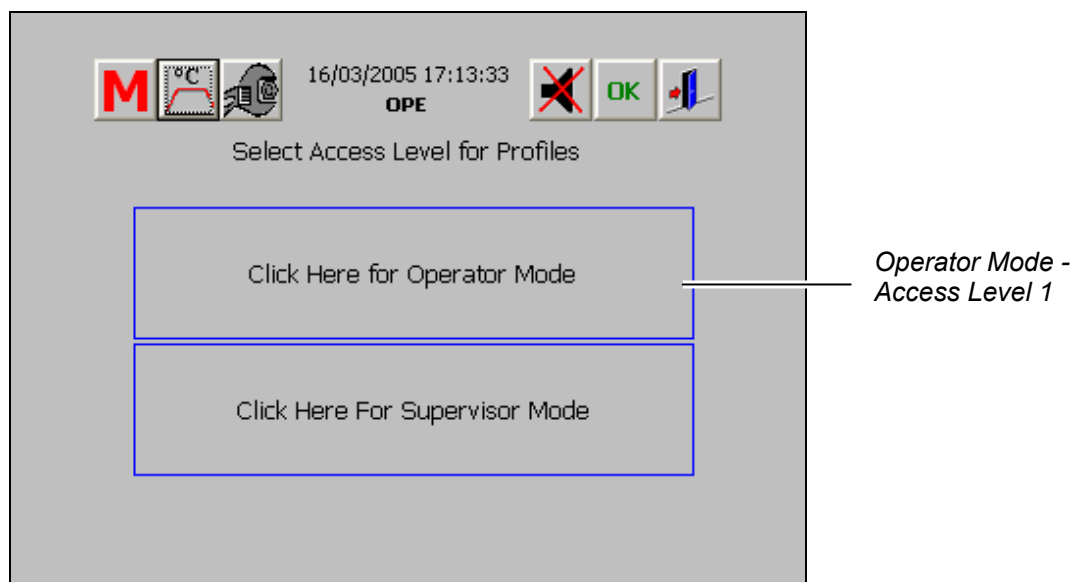


Figure 6-7 Access Level Section



NOTE

Operator Mode (Access Level 1) = download recipe to PLC only
 Supervisor Mode (Access Level 2) = download, change recipe value, create or delete a recipe.

3. The Recipe Parameters screen appears (Figure 6-8). From this screen, you can:

- Check the current recipe parameters
- Select and download another recipe.

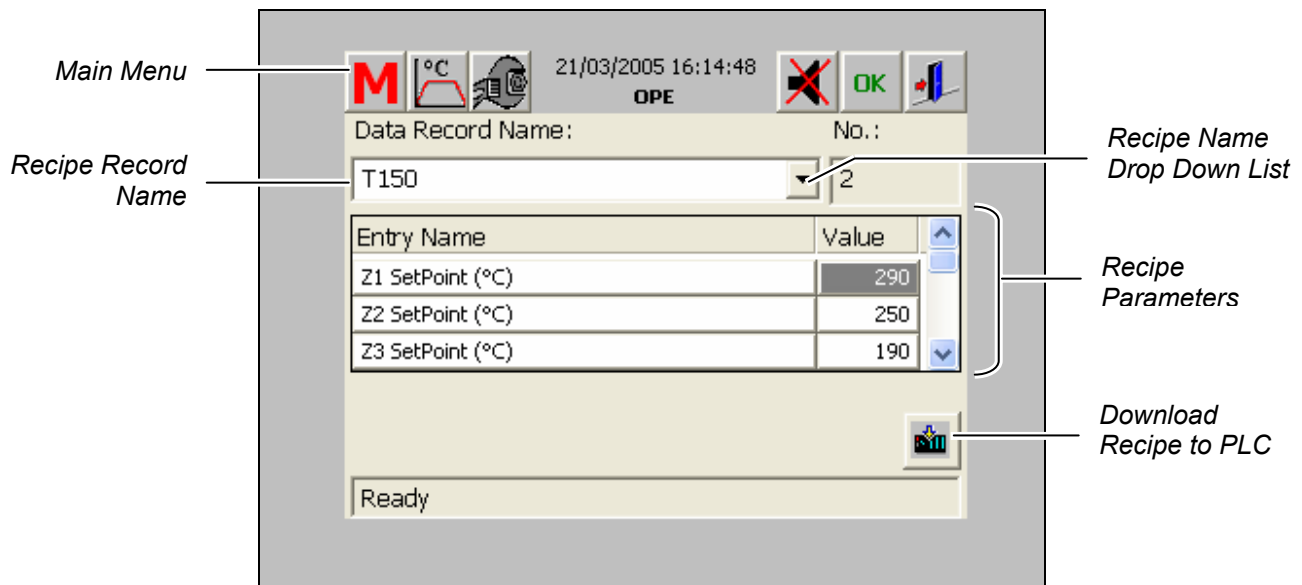


Figure 6-8 Recipe Parameters Screen



NOTE

If they are not correct, the values need to be changed. (Supervisor Mode – Access Level 2 required).

Table 6-1 Recipe Parameters Descriptions

Parameter	Description
Zx Setpoint (°C)	Temperature set point of the x zone, adjustable from 0 to 300°C.
AL2 Band Set Point (°C)	This value represents the tolerance between the actual temperature and the requested temperature in °C. When the AL2 is activated on one zone, the orange light is on. When AL2 disappears on each zone, the green light and the “oven ready signal” switch on.
Speed Set Point (cm/min)	This value is the requested conveyor speed in cm/min.
AL1 Speed Low Alarm (cm/min)	This value is the lower limit of the conveyor speed, below this alarm the red light turns on and the alarm sounds. (see “Alarms” in the Software section of this manual for further information)
AL2 Speed Band Setpoint (cm/min)	This value represents the tolerance between the actual value and the value requested in cm/min.
Length Hole in PCB Setpoint (cm)	This parameter represents the number of holes seen by the optical sensor on one board. Adjust this value to be sure that the PLC counts the correct quantity of boards.
Humidifier (on/off)	The humidifier is activated according to the value of this parameter.

4. From the Recipe Parameters screen (Figure 6-8), click the **"M"** button to return to the Main Menu.
5. On the Main Menu, check that the correct Recipe has been downloaded to the PLC (Figure 6-9).
6. Click the **Start** button to activate the heat and conveyor.

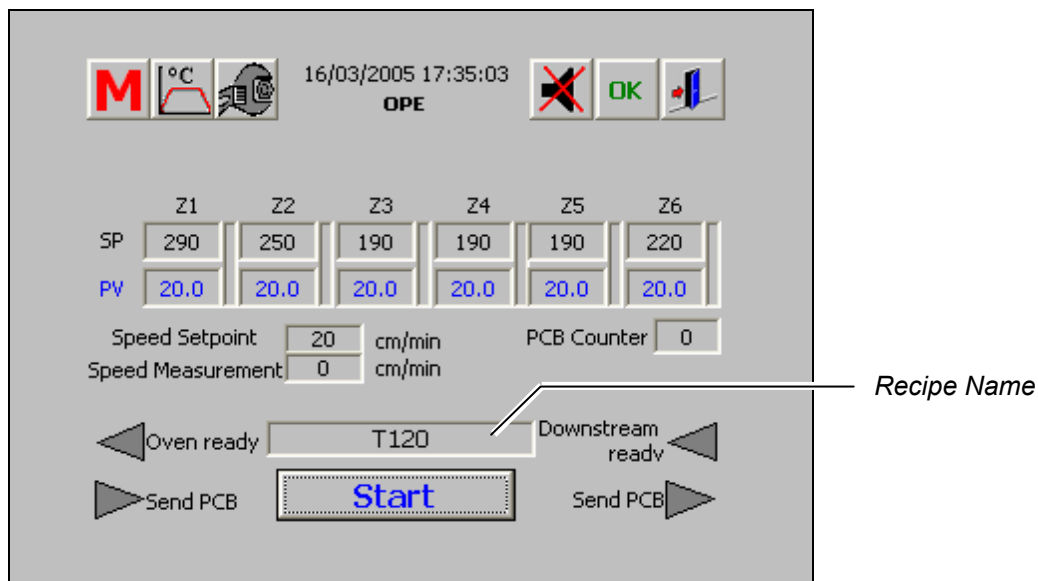


Figure 6-9 Main Menu - Start

7. After you click on the **Start** button, check the Main Menu to confirm that the heat and conveyor are running (Figure 6-10).

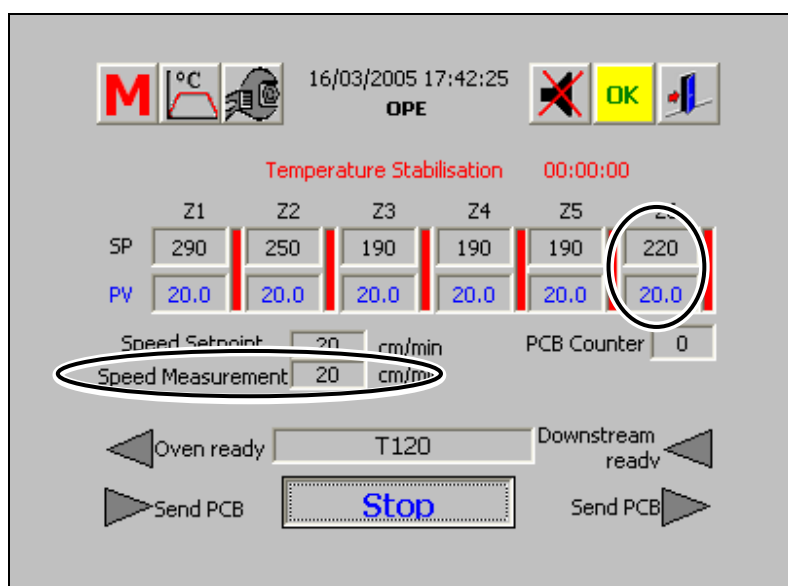


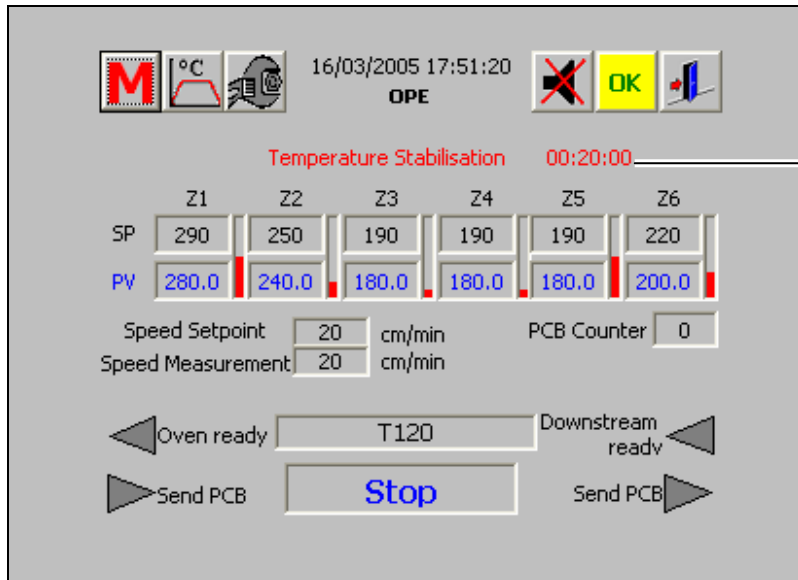
Figure 6-10 Main Menu – Check Temperature and Speed



CAUTION!

If the heat and conveyor are not running, check the alarm screen to determine and solve the problem. See "Alarms" in this section.

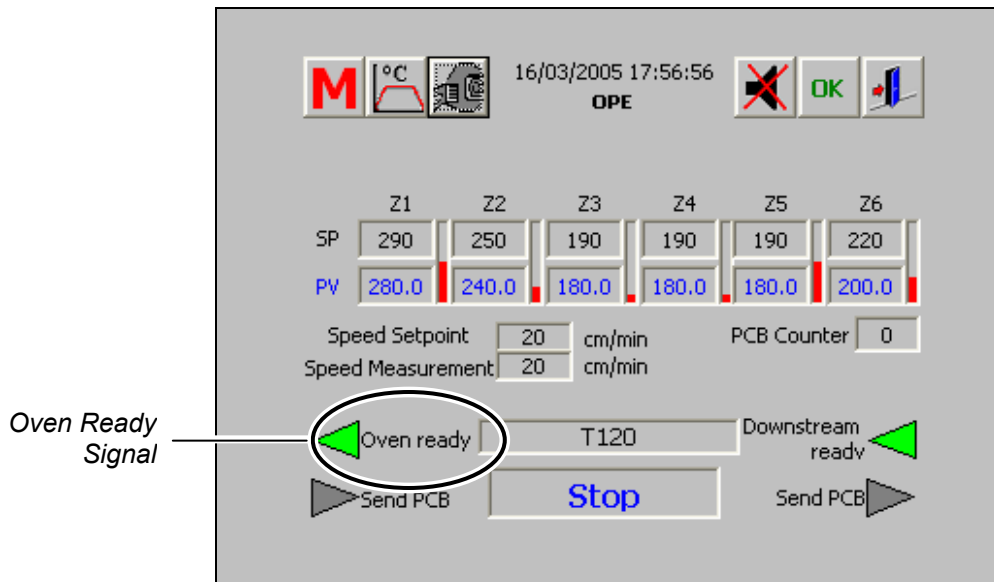
- When all zone temperatures are inside the AL2 alarm band the temperature stabilization timer will start to run (Figure 6-11).



Temperature
Stabilization Timer

Figure 6-11 Main Menu - Temperature Stabilization

- When the timer has stopped, the Oven Ready signal will display green. The oven is ready for production (Figure 6-12).



Oven Ready
Signal

Figure 6-12 Main Menu - Oven Ready

Recipe Management

1. To access recipe management, from the Main Menu click the **Recipe Menu** button (see Figure 6-6). Click on the **Supervisor Mode** button (Figure 6-13).

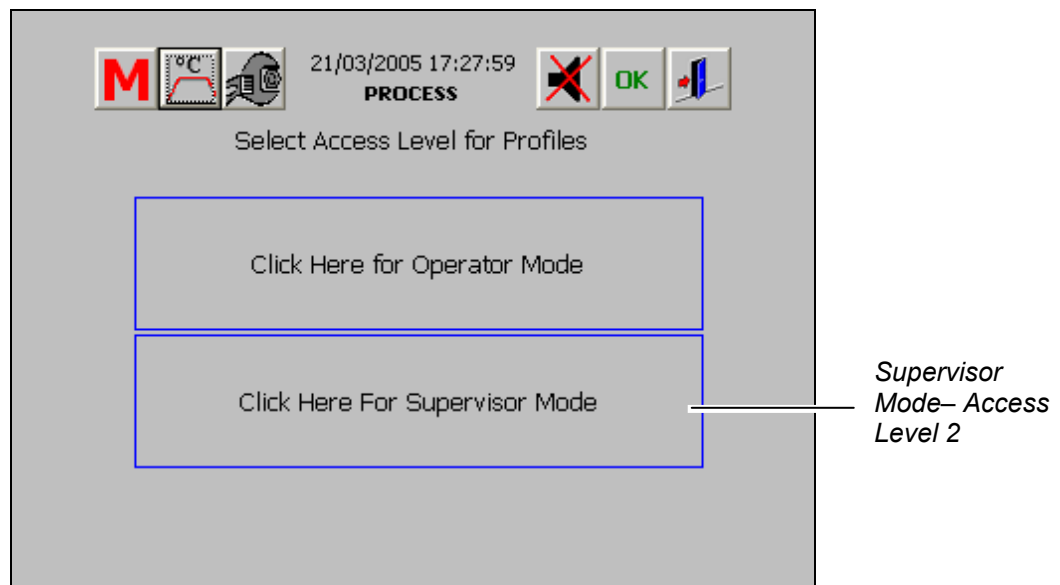


Figure 6-13 Access Levels

2. The Recipe Parameters screen appears. Enter or change the **Recipe Values** (Figure 6-14).

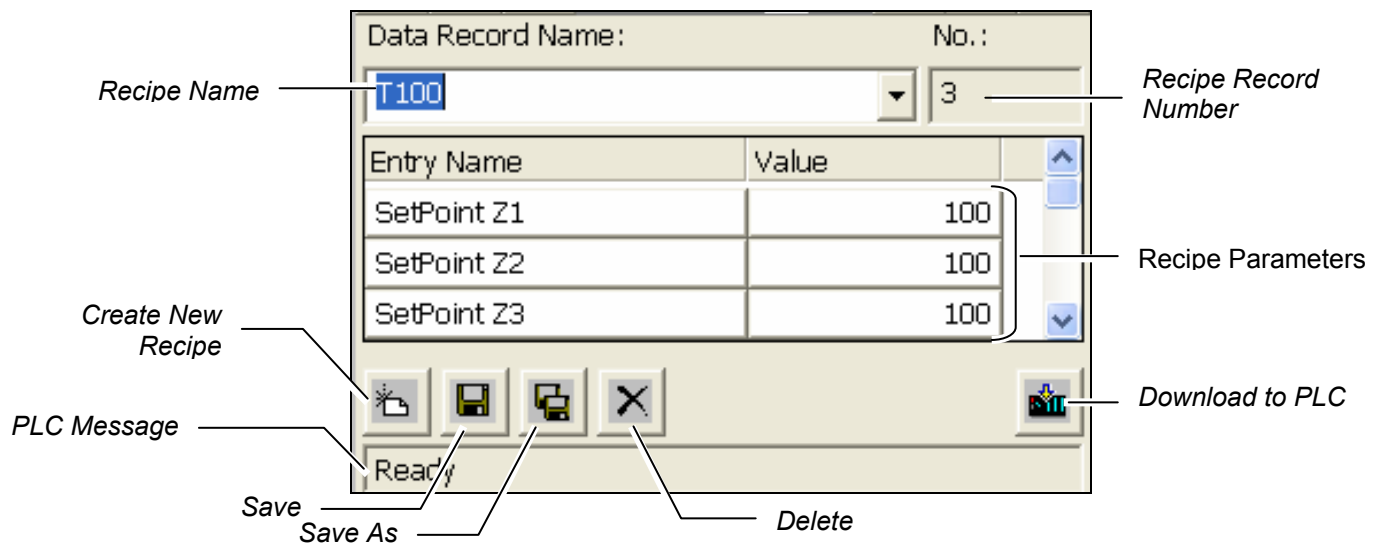


Figure 6-14 Recipe Parameters

Control Menu

1. From the Main Menu, click on the **Control Menu** button (Figure 6-15).

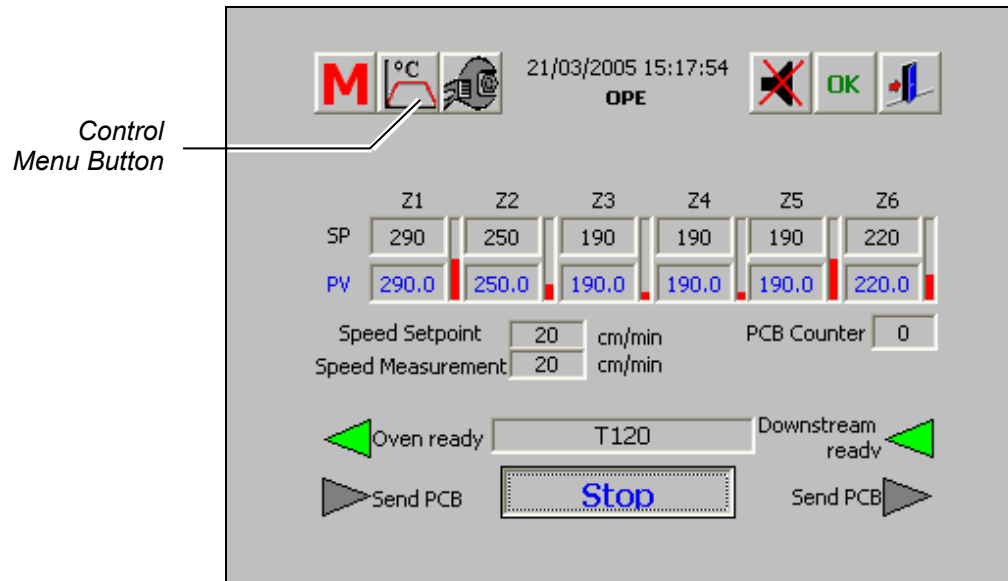


Figure 6-15 Main Menu – Control Menu Button

 **NOTES** Control functions are not available in operator mode (access level 1). Access to all functions is only available at password level 2 (Supervisor) or above. To change the password level, follow the instructions under "Password Management".

2. The Control Menu appears (Figure 6-16).

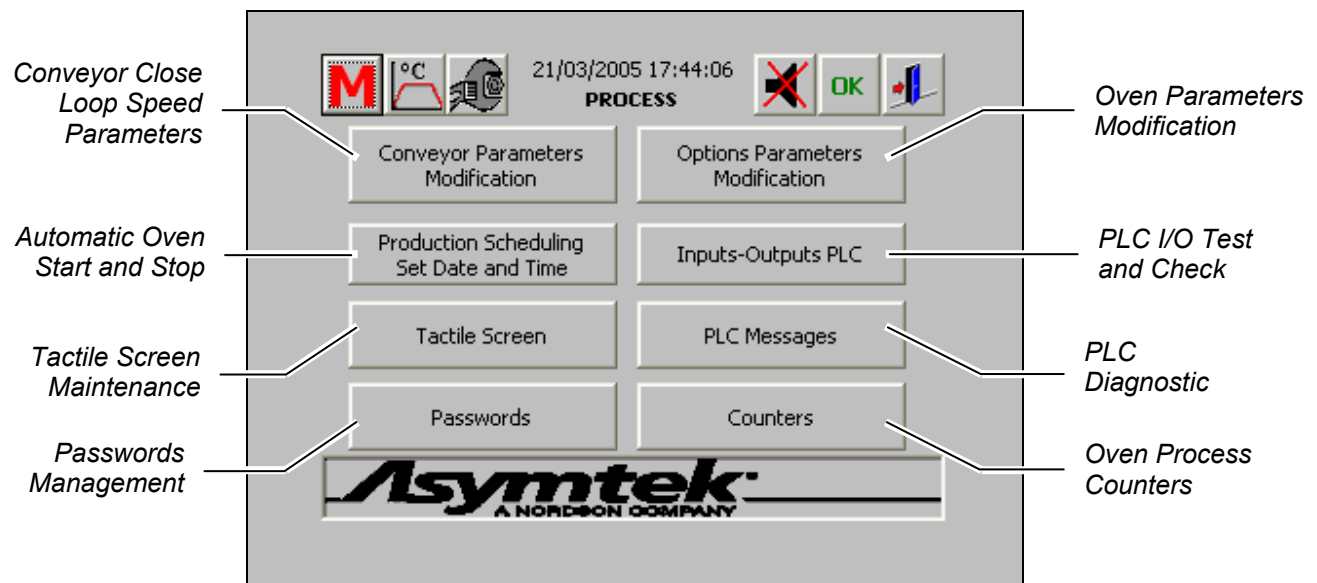


Figure 6-16 Control Menu

Password Management

1. From the Control Menu click on the **Password Management** button to access the Password Management screen (Figure 6-17).

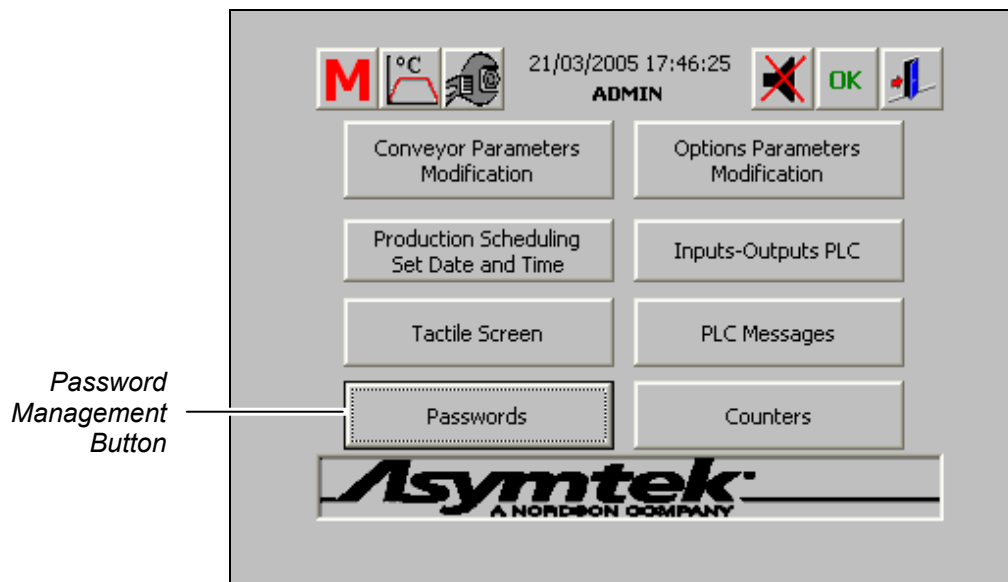


Figure 6-17 Control Menu – Password Management Screen

2. The Password Management screen appears. Click on user name, password, or access level to make changes.

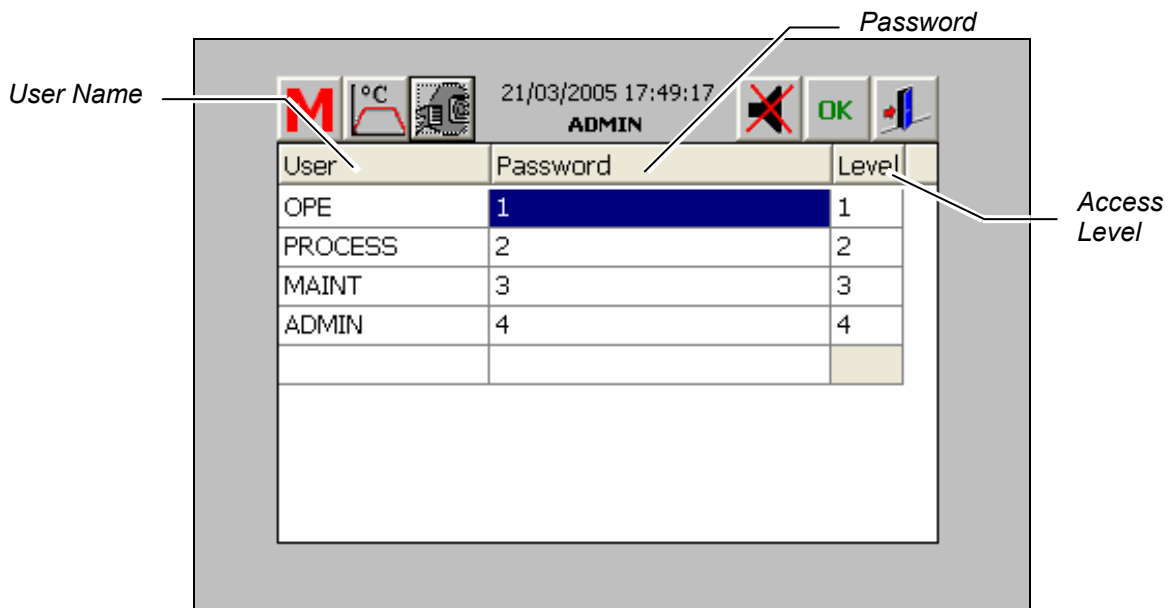


Figure 6-18 Password Management Screen

3. From the Virtual Keyboard (Figure 6-19), enter the necessary changes. Use the **Backspace Key** to make any corrections.

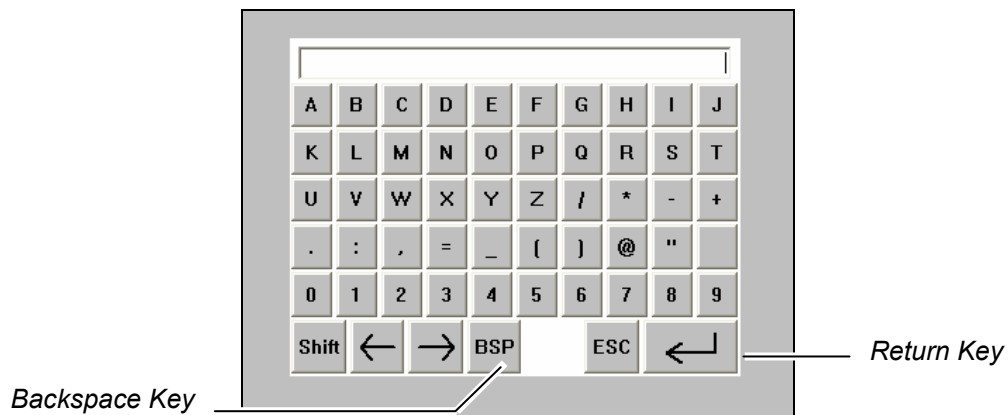


Figure 6-19 Virtual Keyboard

4. Click on the **Return Key**. Check that the access level is correct on the Main Menu (Figure 6-20).

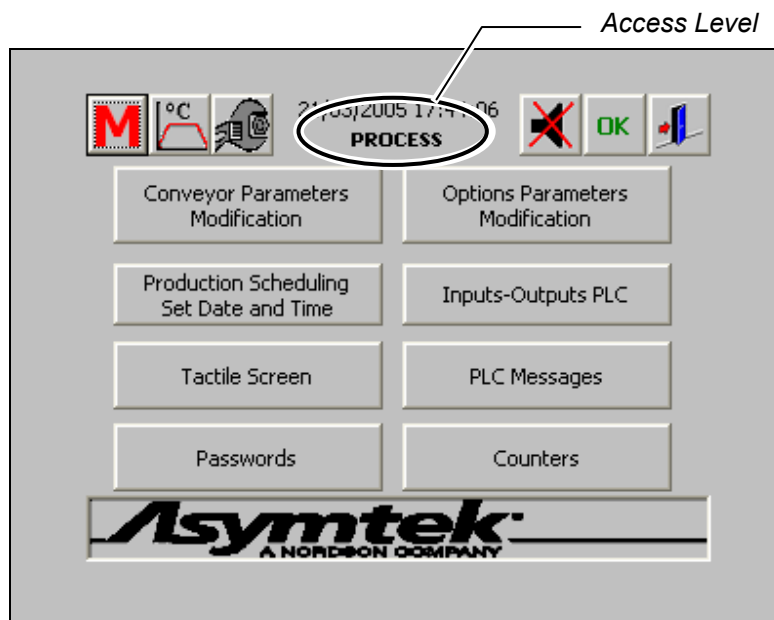


Figure 6-20 Main Menu - Access Level

Inputs/Outputs

View Inputs

1. To view the input status of the PLC, from the Control Menu, click on the **Inputs-Outputs PLC** button (Figure 6-21).

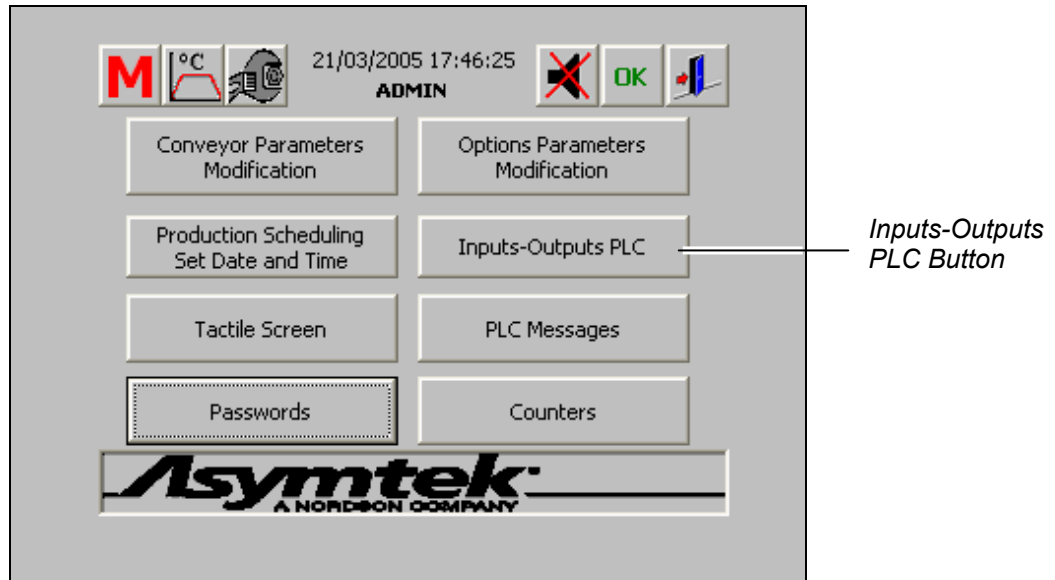


Figure 6-21 Control Menu – Inputs/Outputs PLC

2. The Inputs/Outputs Selection screen will appear. Click on **Inputs** (Figure 6-22).

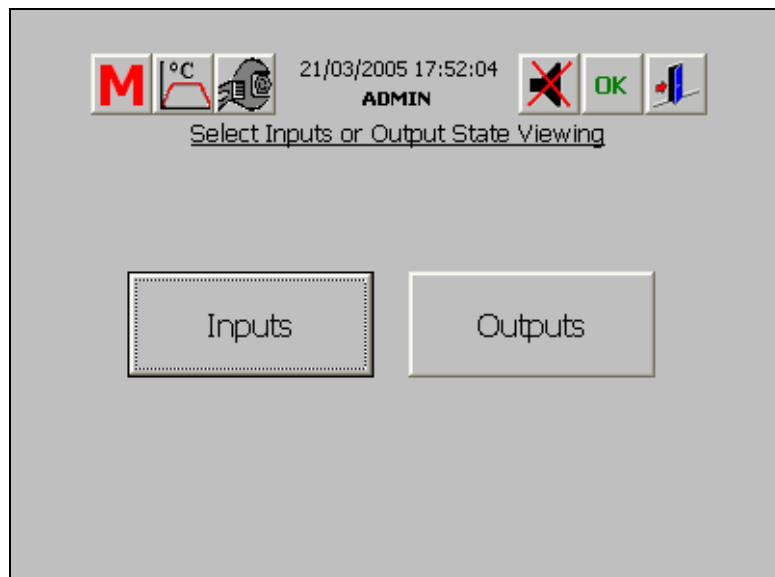


Figure 6-22 Inputs Selection Screen

3. The Inputs Status box will appear (Figure 6-23).

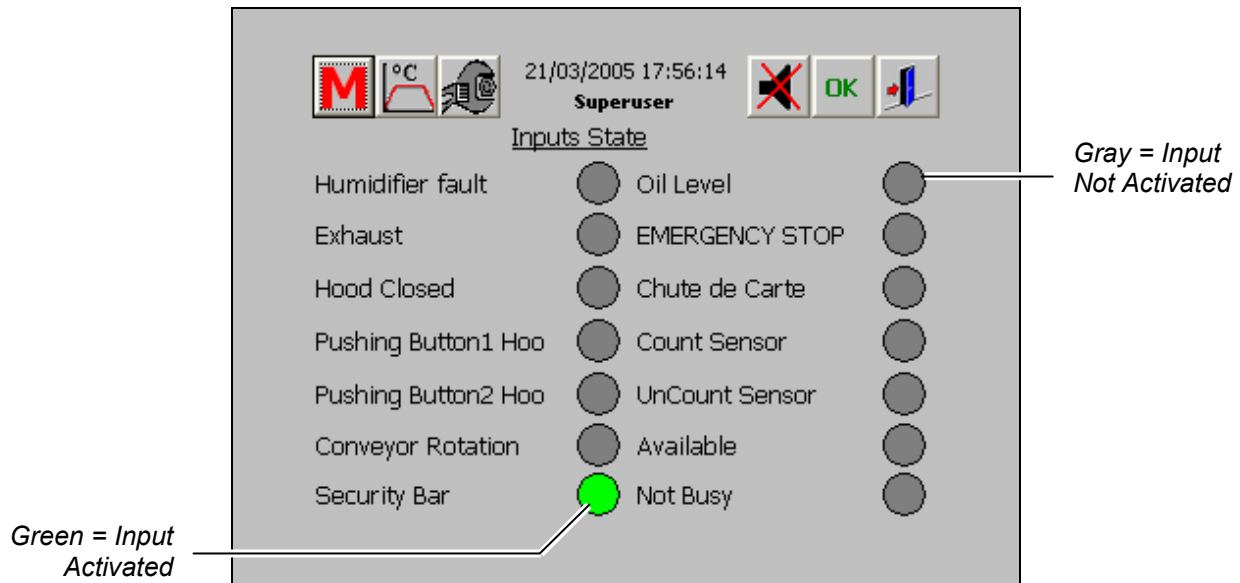


Figure 6-23 Inputs Status Box

 **NOTE** A green button indicates inputs are activated. A gray button indicates inputs are not activated. You cannot change the input status.

View Outputs

1. To view the Output Status of the PLC, click the **Inputs-Outputs PLC** button, on the Control Menu (See Figure 6-21). The Input/Output Selection screen appears (Figure 6-24). Click on the **Outputs** button.

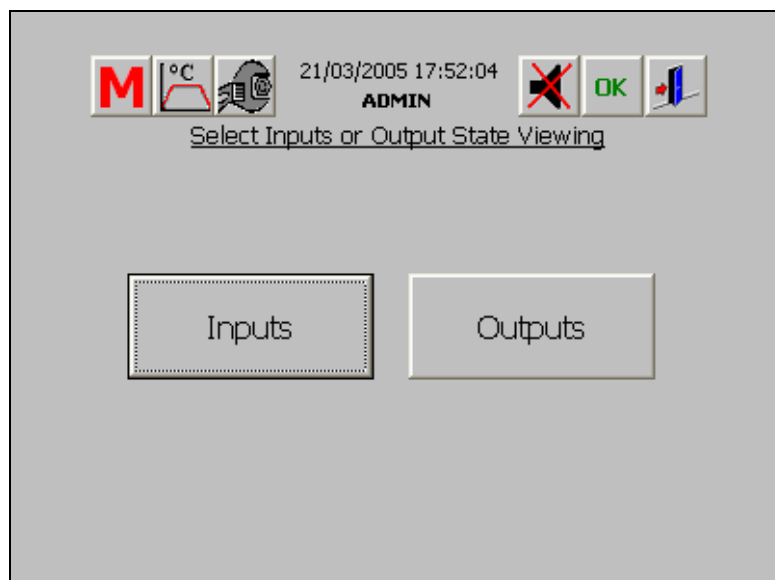


Figure 6-24 Outputs Selection Screen

2. The Outputs - Activate Test screen appears (Figure 6-25). Click on the **Activate Test** button to access the Outputs - Activate Test screen (Figure 6-27).

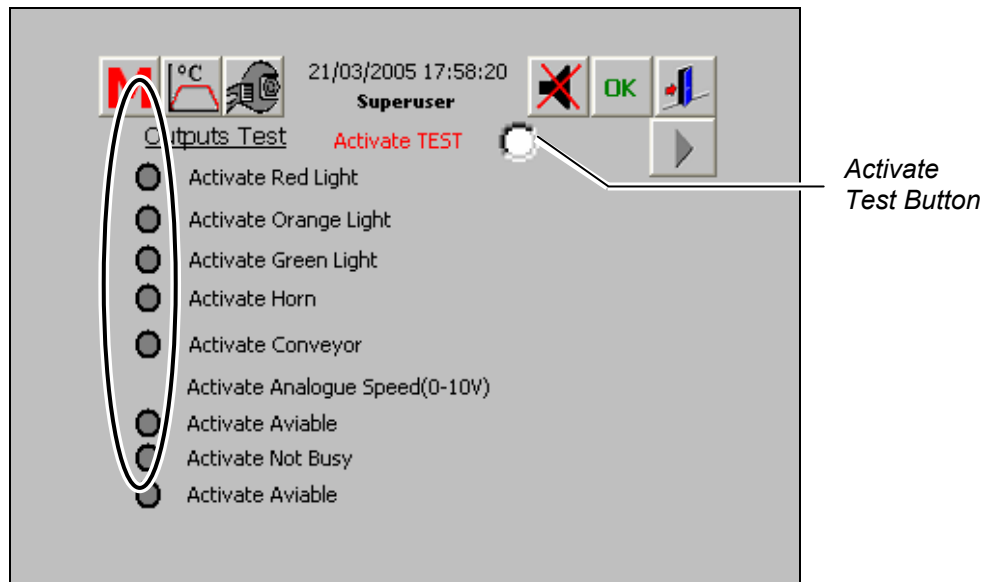


Figure 6-25 Outputs - Activate Test Screen

3. A warning message will display to check the oven production (Figure 6-26).



Figure 6-26 Activate Test – Warning Message



WARNING!

Activating the Outputs Test will stop the oven. Check to see if the oven is in production.

4. The Outputs - Activate Test screen appears again with selections available (Figure 6-27).

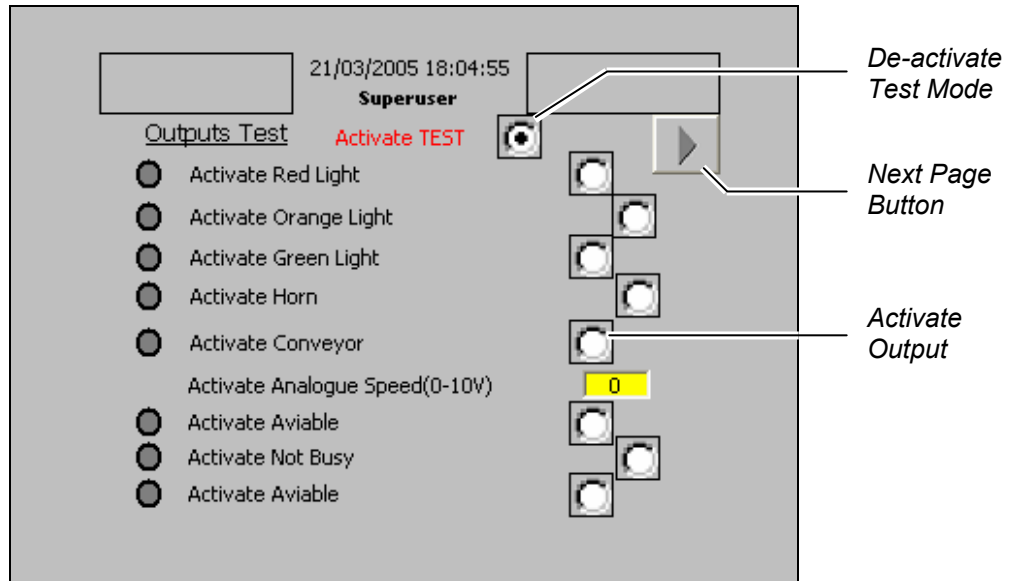


Figure 6-27 Outputs - Activate Test Screen

Conveyor Parameters Modifications

1. To adjust the close loop conveyor speed parameters, click on the **Conveyor Parameters Modification** button from the Control Menu (Figure 6-28).

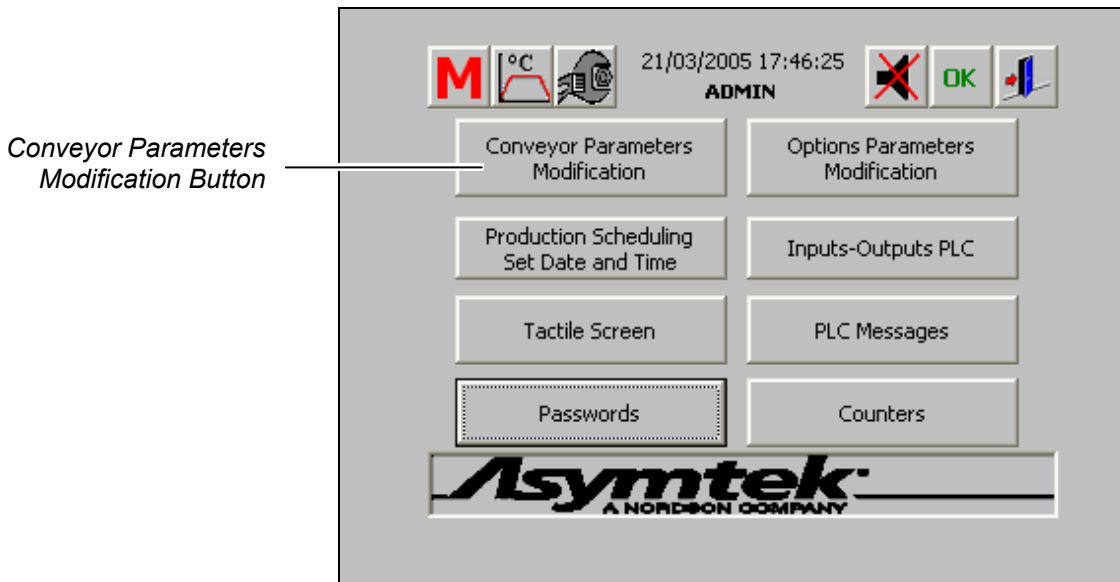


Figure 6-28 Control Menu – Conveyor Parameters Modification Button

2. The Force Conveyor Measurement screen appears (Figure 6-29). To start the speed measurement, click on the **Force Conveyor Running** button. A message will display prompting you to wait until conveyor speed measurement is finished. Check that the conveyor moves and wait for the measurement to end.

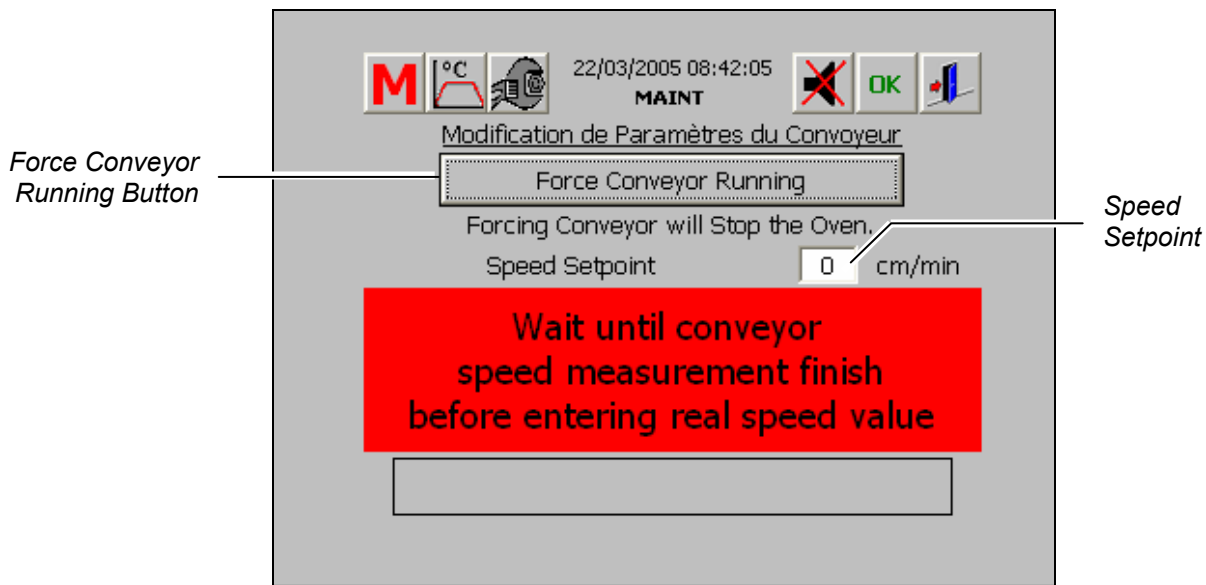


Figure 6-29 Force Conveyor Measurement Screen



NOTE Forcing the conveyor will stop the oven, be careful if the oven is in production.

3. When the measurement is finished, check the real speed against the measured speed (Figure 6-30). If the real speed is different from the measured speed, enter the **Real Speed** of the conveyor. Next, click on the **Adjustment Real Speed/Measured Speed** button. The PLC will automatically correct the calculation of the measured speed.

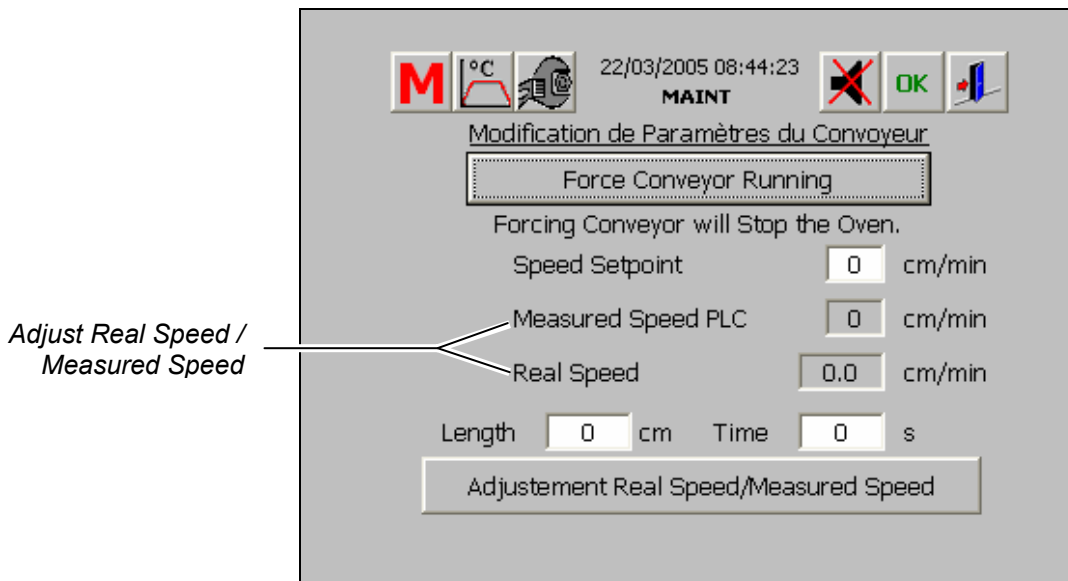


Figure 6-30 Force Conveyor Running Screen

4. A message will display to let you know the conveyor parameters have been updated (Figure 6-31). Click **"OK"** to return to the Main Menu.



Figure 6-31 Conveyor Parameters Updated Message

Set Date and Time Procedure

On the Main Menu, if the date/hour is flashing red you will need to reset the date and time before programming any production scheduling.

1. From the Main Menu, click on the **Control Menu** button. To set the time and date, click on the **Set Date and Time** button (Figure 6-32).

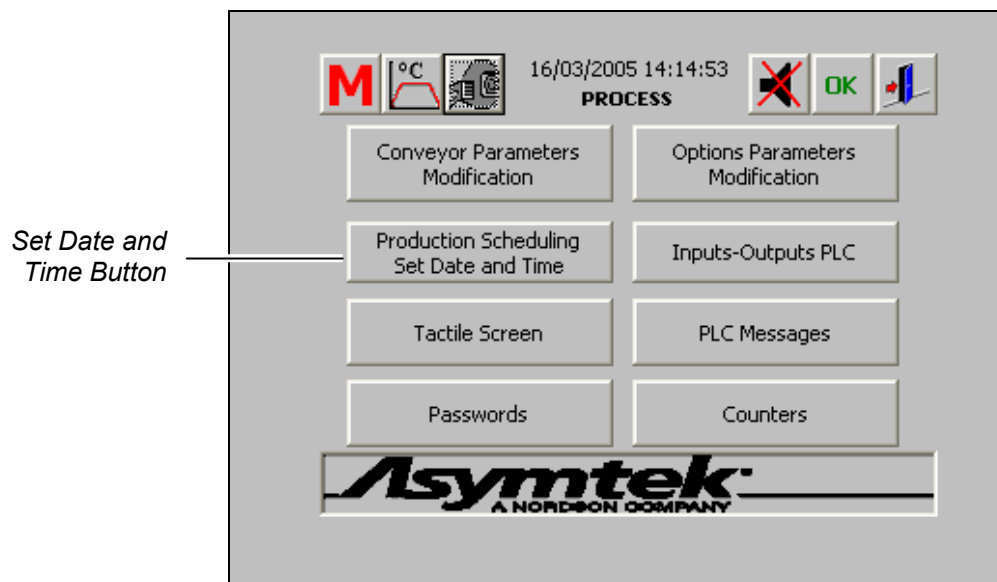


Figure 6-32 Control Menu – Set Date and Time

2. The Production Scheduling screen appears. Click on the **Clock** button (Figure 6-33).

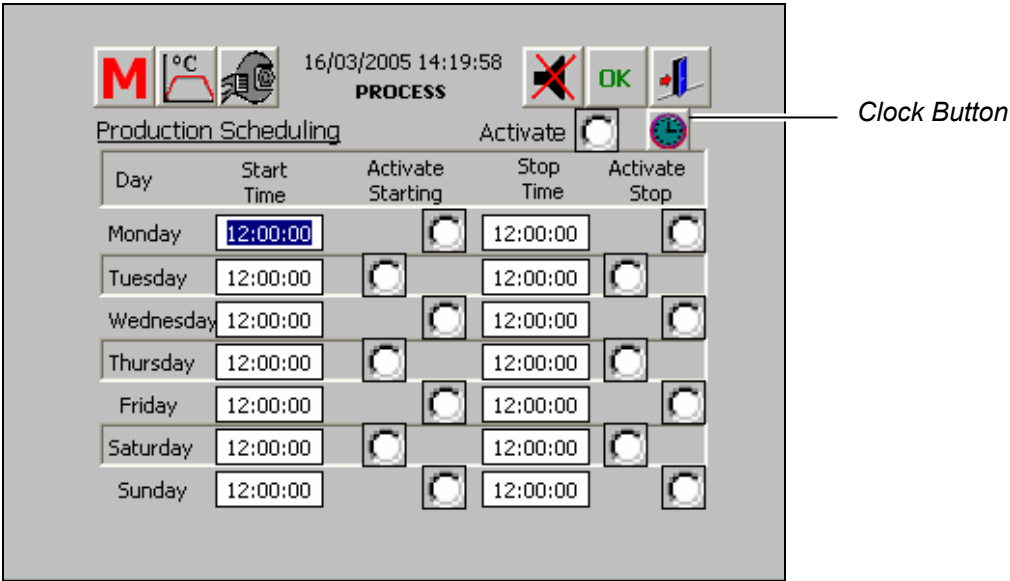


Figure 6-33 Production Scheduling Screen – Clock Button

3. The following screen appears to enter the correct date and time (Figure 6-34). Enter the correct **Time** and click **Enter**. Follow the same procedure to set the date. To download the new parameters to the PLC click on the **Clock** button.

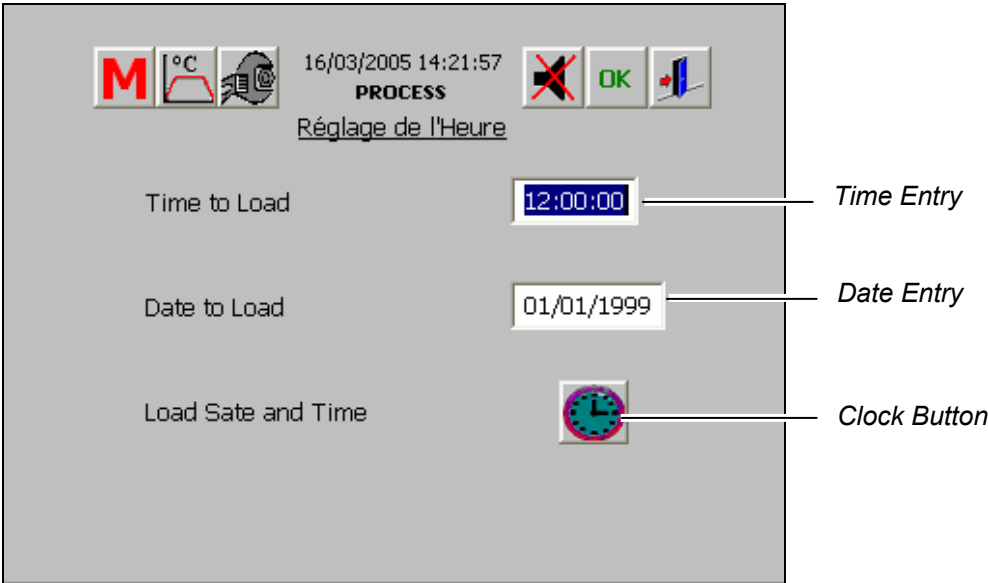


Figure 6-34 Enter Date and Time

Production Scheduling

1. To set the production scheduling time, from the Control Menu click on the **Production Scheduling** button (Figure 6-35).

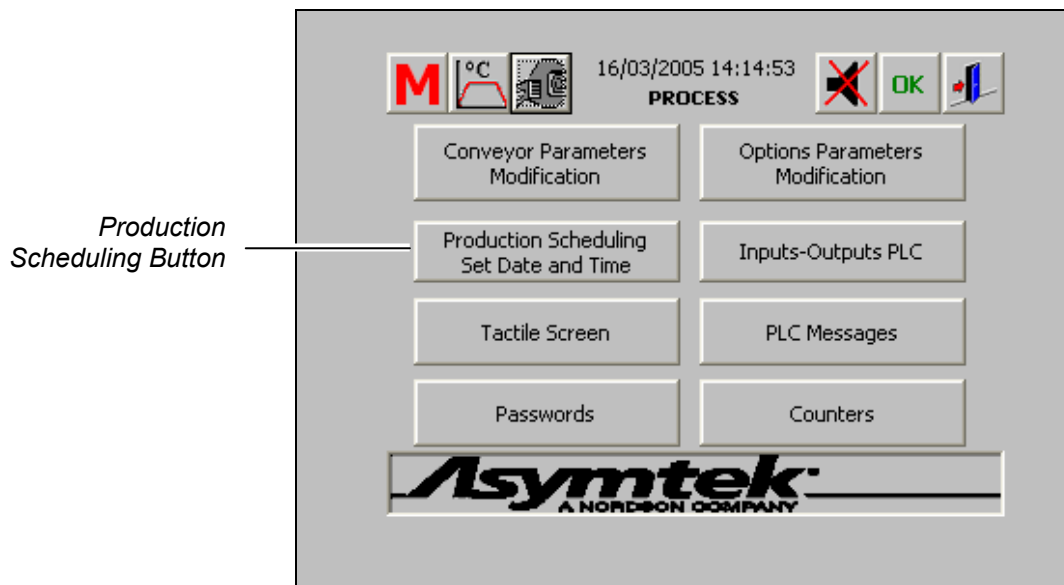


Figure 6-35 Control Menu – Production Scheduling

2. The Production Scheduling screen appears (Figure 6-36). Enter and activate the **Start Time** and **Stop Time**. Activate the Production Scheduling by clicking on the **Activate** button.

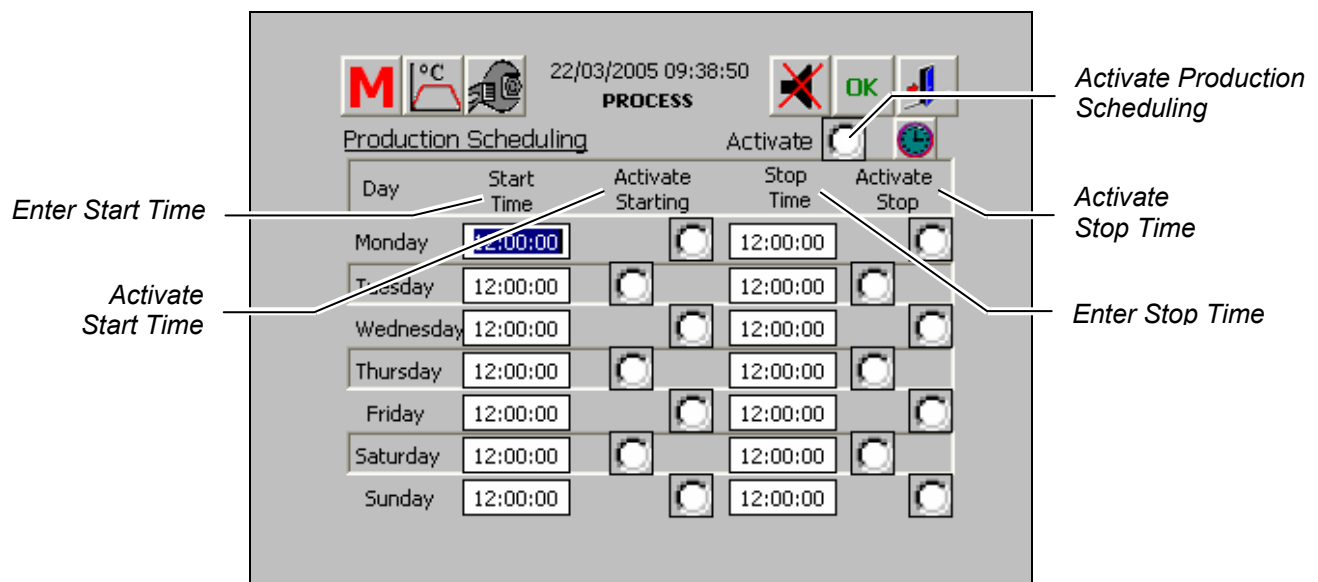


Figure 6-36 Production Scheduling – Enter Stop/Start Time

**CAUTION!**

Make sure you activate the scheduling by clicking on the Activate button before returning to the Main Menu.

3. When automatic production is activated, the following message will appear on the Main Menu (Figure 6-37).

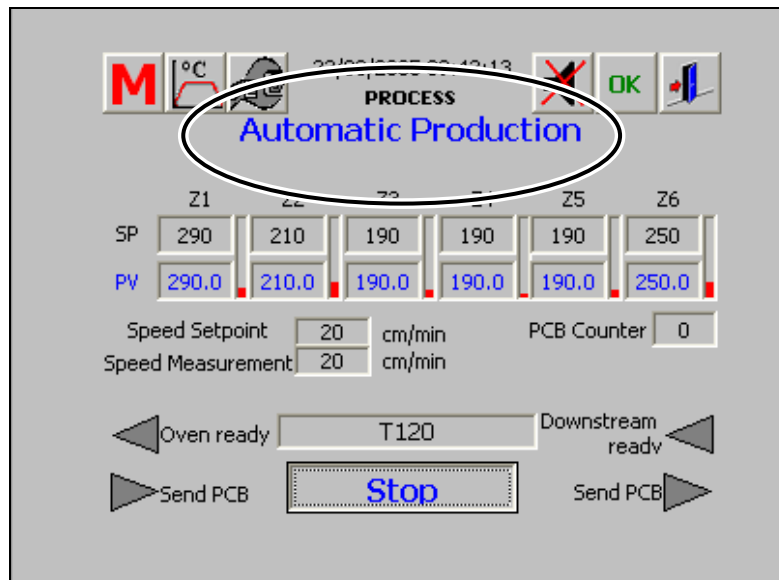


Figure 6-37 Main Menu - Automatic Production Activated

Tactile Screen

1. To adjust the Tactile Screen Maintenance, from the Control Menu click on the **Tactile Screen** button (Figure 6-38).

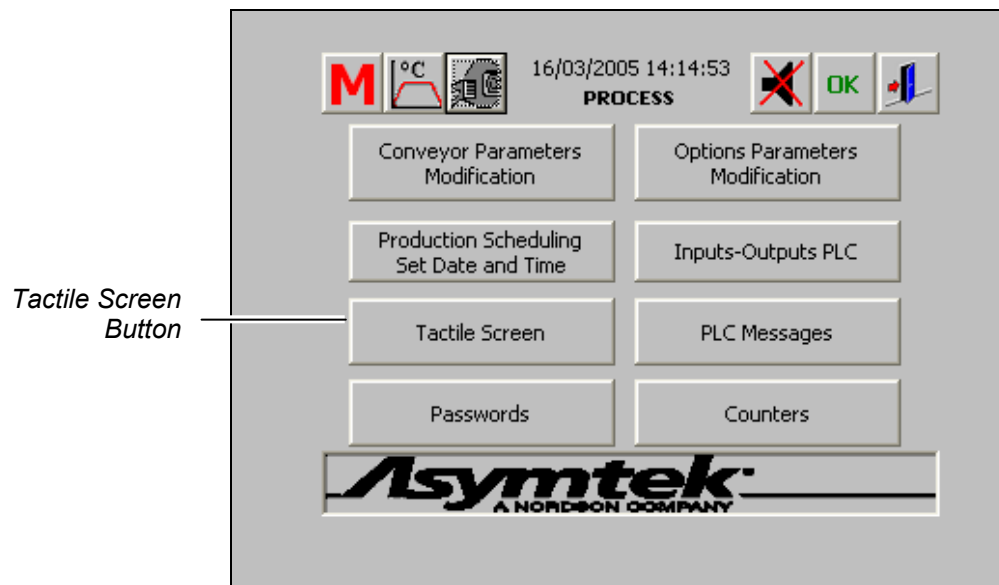


Figure 6-38 Control Menu – Tactile Screen Button

2. The Tactile Screen Parameters screen appears (Figure 6-39).
 - Click on the **Cleaning** button to disable the Tactile Screen for 30 seconds to clean.
 - Click on the **Sensitivity** button to adjust the Tactile Screen sensitivity.
 - Click on the **Contrast** buttons to increase or decrease the screen contrast.

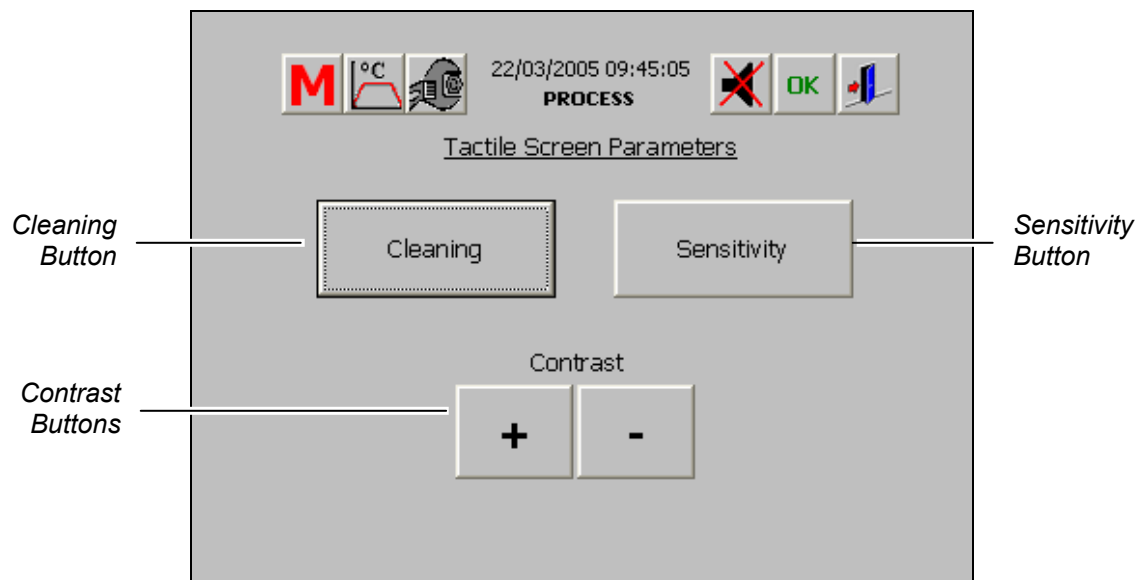


Figure 6-39 Tactile Screen Parameters Screen

Options Parameters Modifications

1. To adjust the options parameters, on the Control Menu click on the **Options Parameters Modification** button (Figure 6-40).

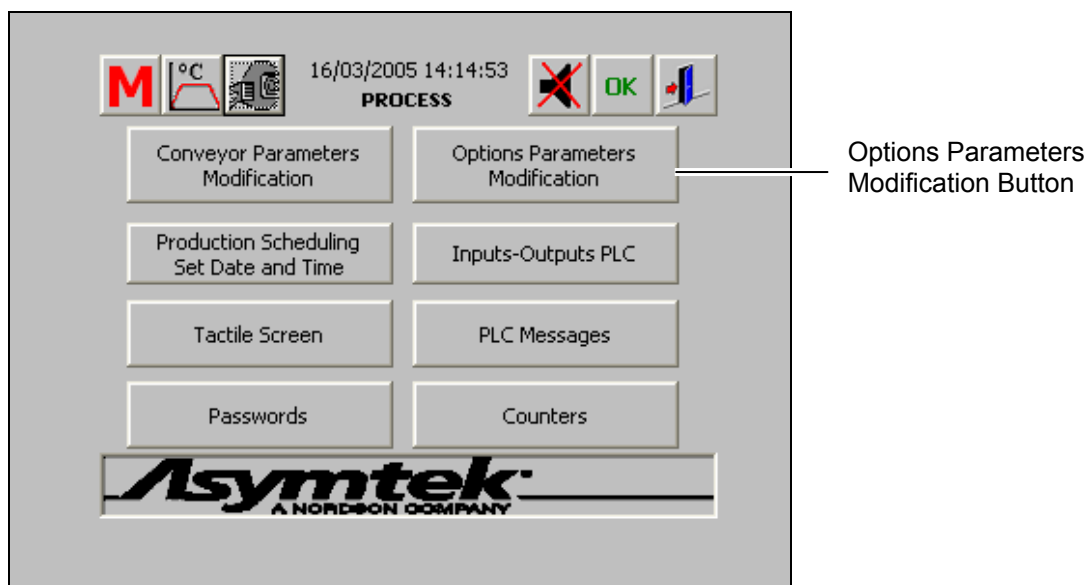


Figure 6-40 Control Menu – Options Parameters Modification Button

2. The Options Parameters Modification screen appears (Figure 6-41). Options can be adjusted on this screen.

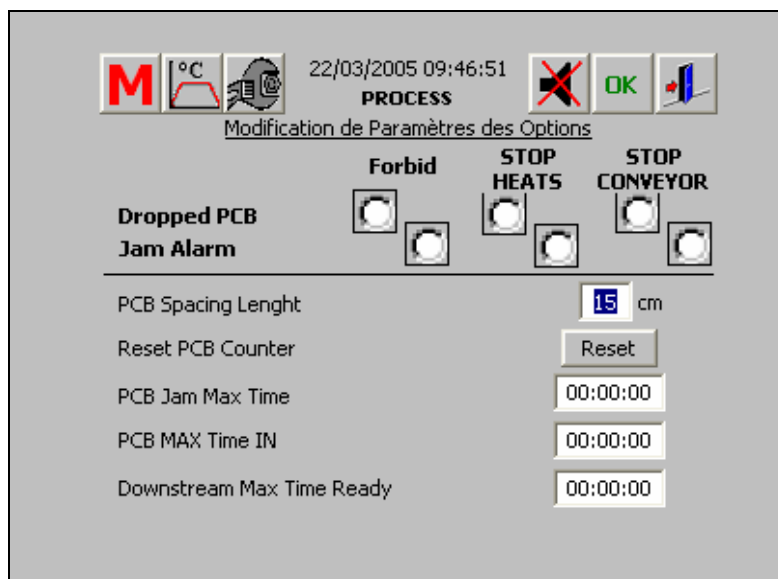


Figure 6-41 Options Parameters Modification Screen



NOTE

The Options Parameters Modification screen will vary according to options present on the equipment. The PCB counters can be checked on the Main Menu.

PLC Messages

1. To check the messages from the PLC, from the Control Menu select the **PLC Messages** button (Figure 6-42).

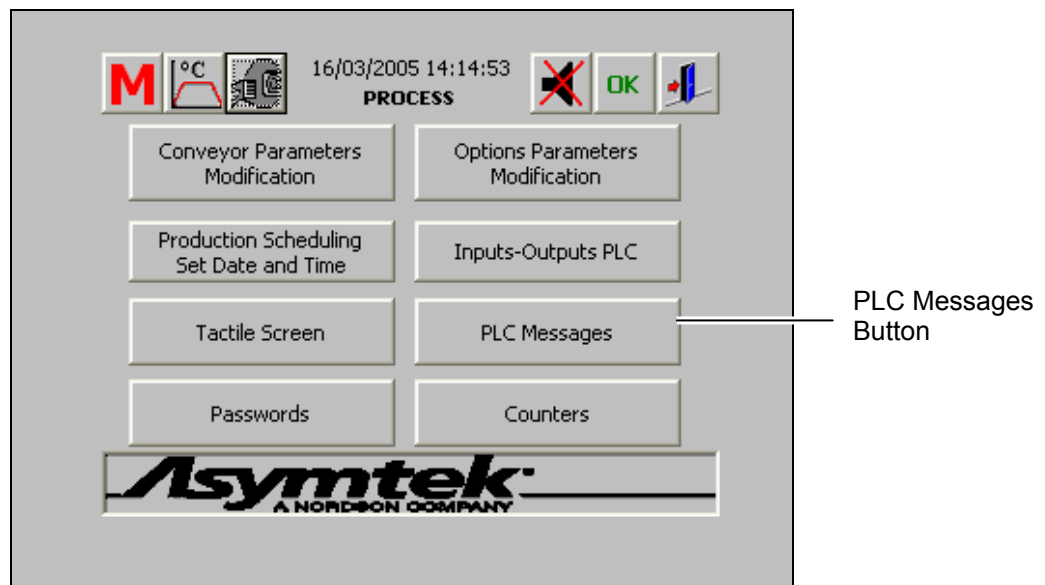


Figure 6-42 Control Menu – PLC Messages

2. The PLC Message screen appears with any messages (Figure 6-43).

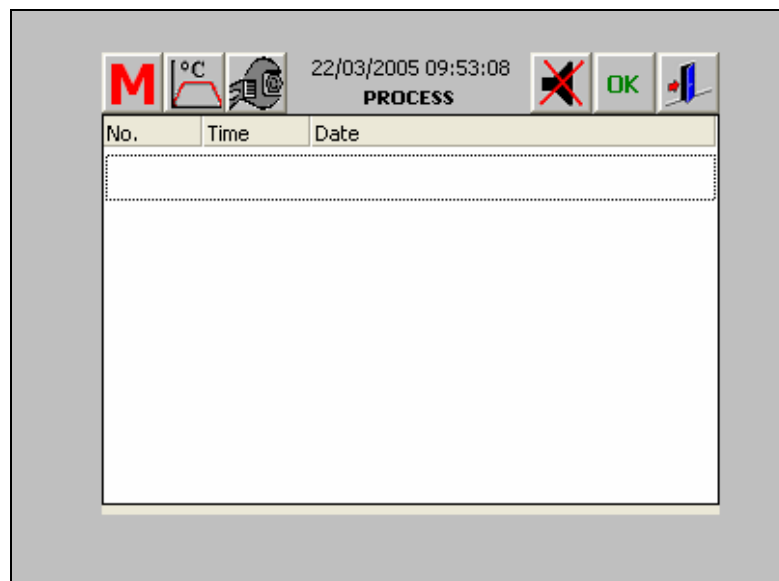


Figure 6-43 PLC Message Screen

Counters

1. To access the Oven Production Counters, on the Control Menu click on the **Counters** button (Figure 6-44).

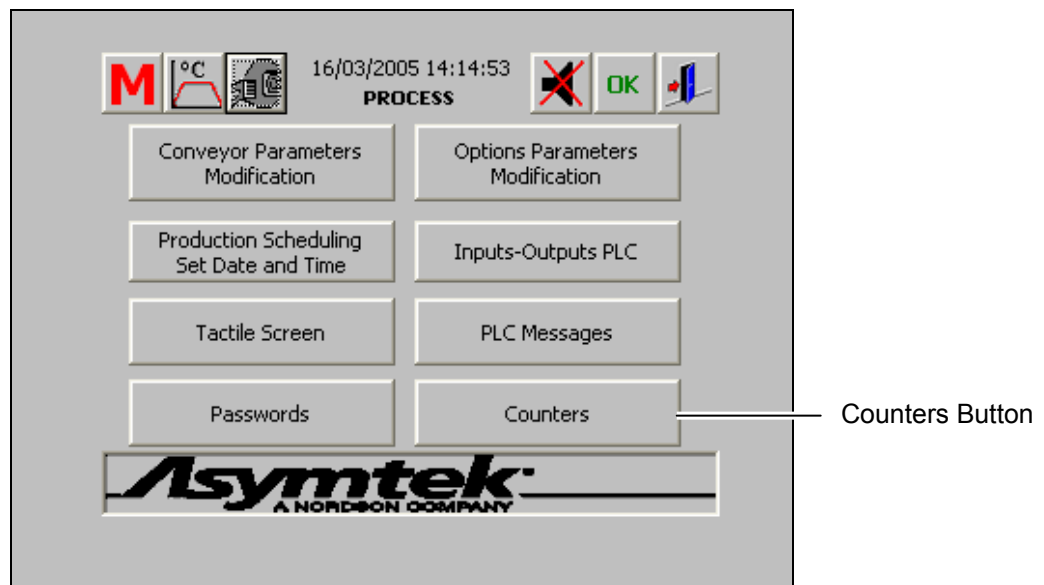


Figure 6-44 Control Menu – Counters Button

2. The following screen appears displaying the counter values (Figure 6-45).

 **NOTE** Counter values cannot be changed.

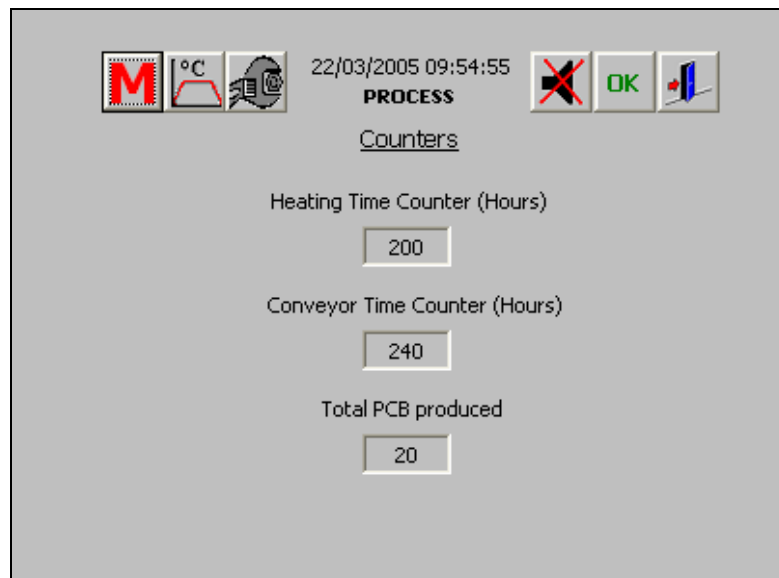


Figure 6-45 Oven Production Counters Screen

Alarms

Depending on the type of alarm, the "OK" button will flash green/yellow with an orange beacon light (Figure 6-46), or red with a red beacon light (Figure 6-47). To access the Alarm Page screen, from the Main Menu click on the **Reset Alarms** button (Figure 6-48).

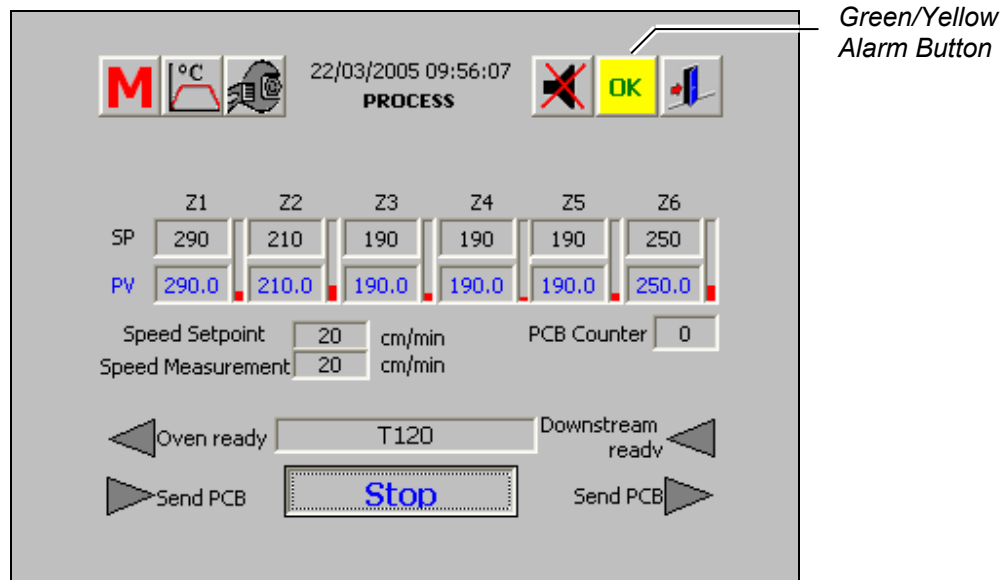


Figure 6-46 Green/Yellow Alarm

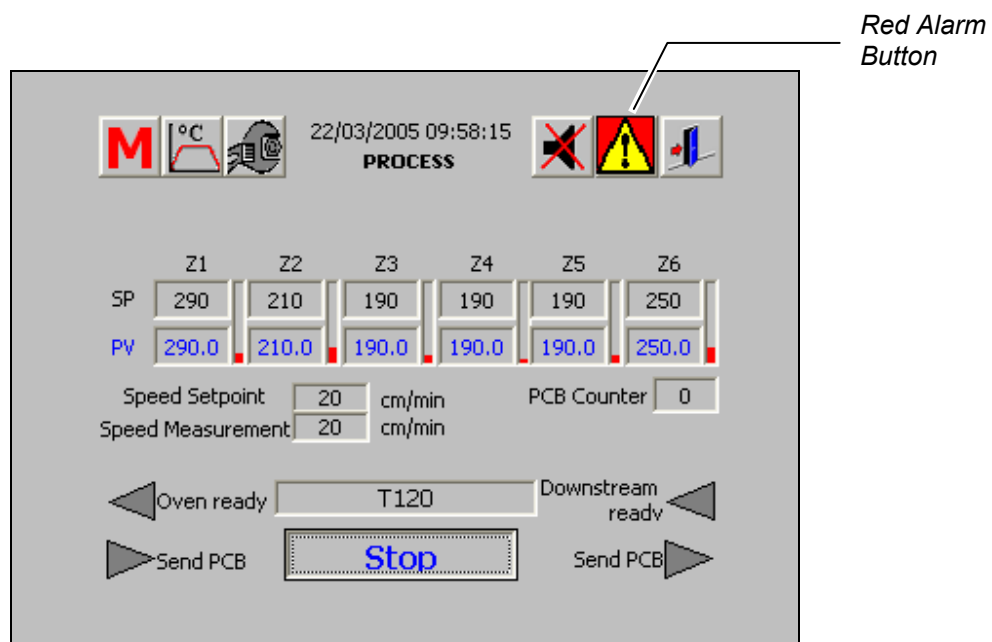


Figure 6-47 Red Alarm

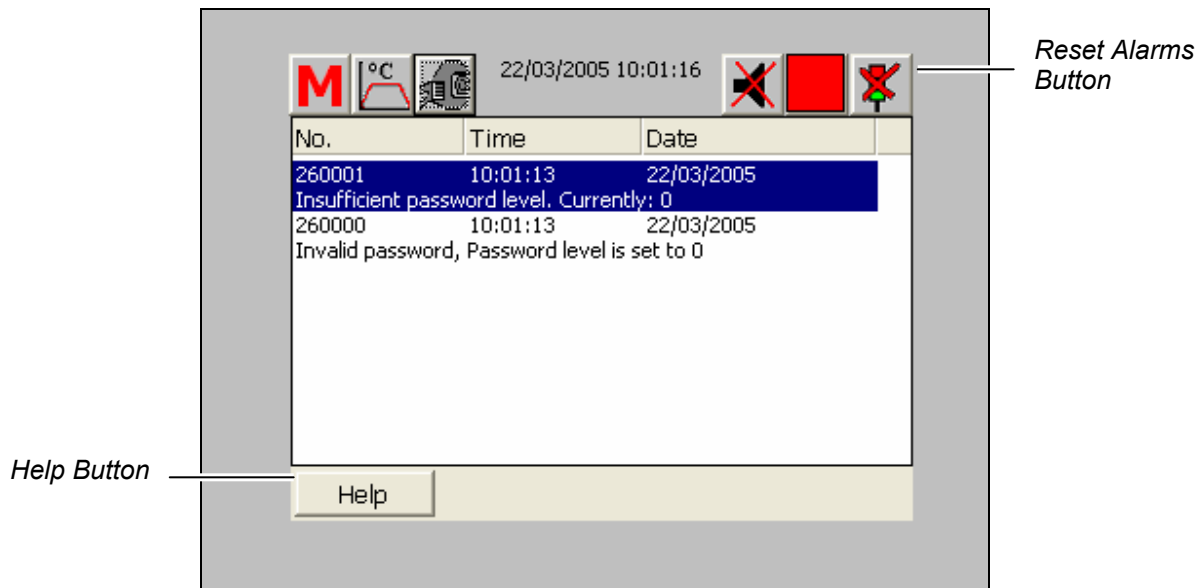


Figure 6-48 Alarm Page Screen

Resetting the Alarms

After the issue has been resolved the alarms will need to be reset.

1. On the Banner screen, select the language you prefer by clicking on the **French** or **English** flag (Figure 6-49). Next click on the **"M"** button to display the Main Menu.

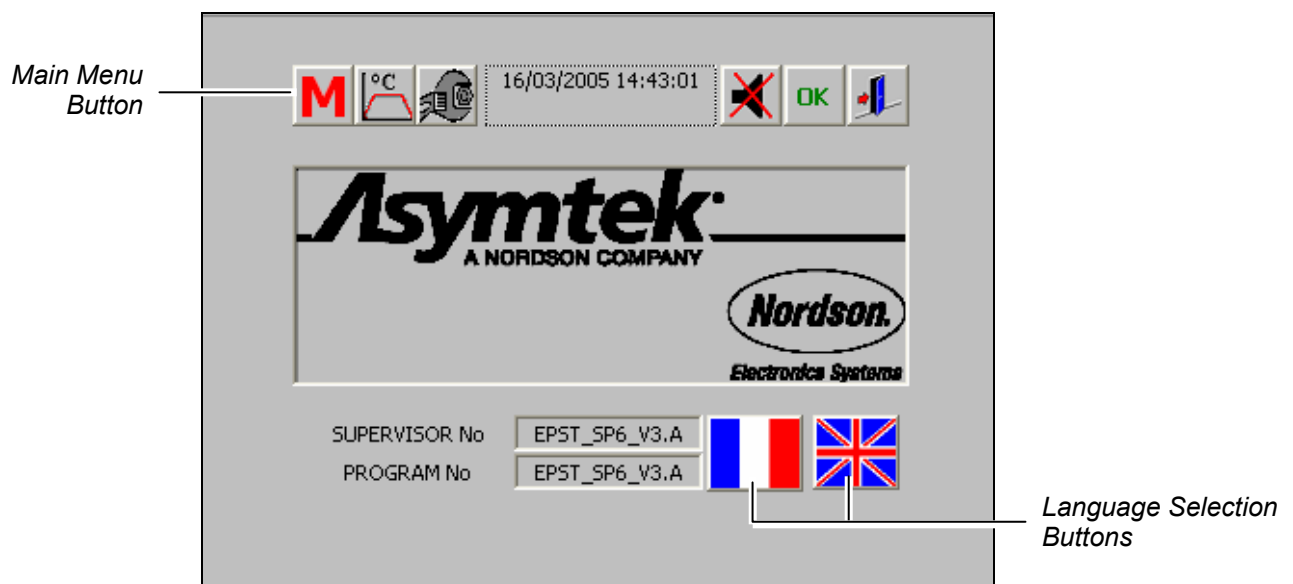


Figure 6-49 Banner Screen

- The Main Menu is displayed. Click on the **Alarm Page** button (Figure 6-50).

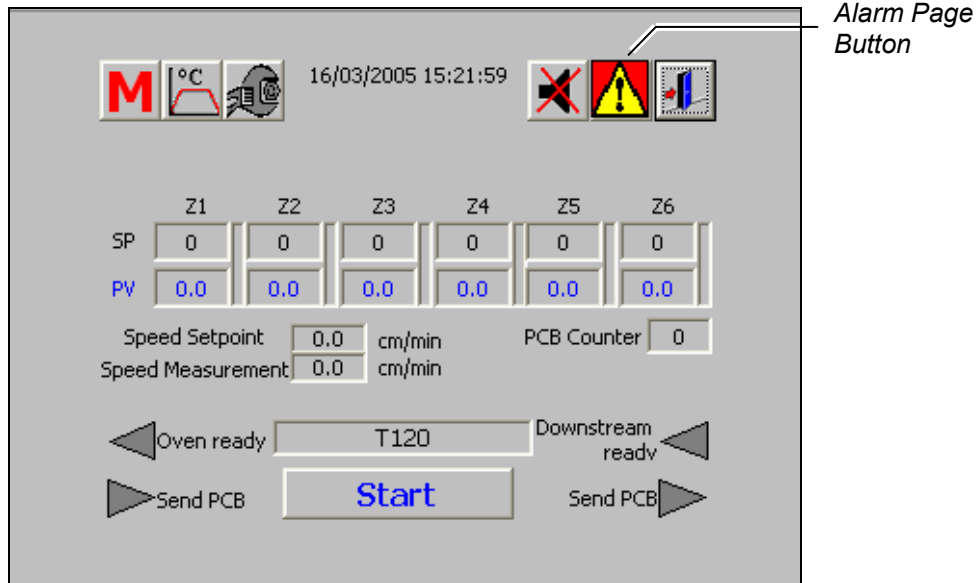


Figure 6-50 Main Menu – Alarm Page Button

- The Alarm Page screen is displayed. Reset all alarms by clicking on the **Reset Alarm** button (Figure 6-51).

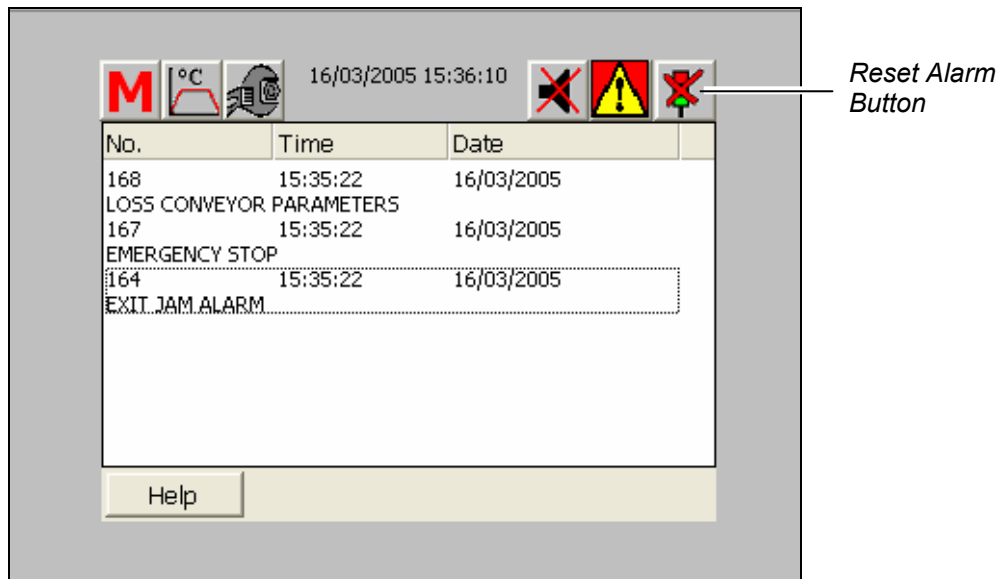


Figure 6-51 Alarm Page Screen

4. The following Password Login dialog box appears (Figure 6-52). Click inside this box to access the virtual keyboard. An access level password equal or superior to 1 is requested to reset the alarms. Enter the **Password** to reset the alarms.

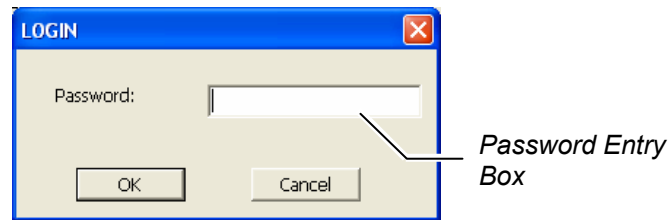


Figure 6-52 Password Login Box

5. When the alarms are reset, the alarm button stops flashing and "OK" appears at the top right corner of the screen (Figure 6-53).

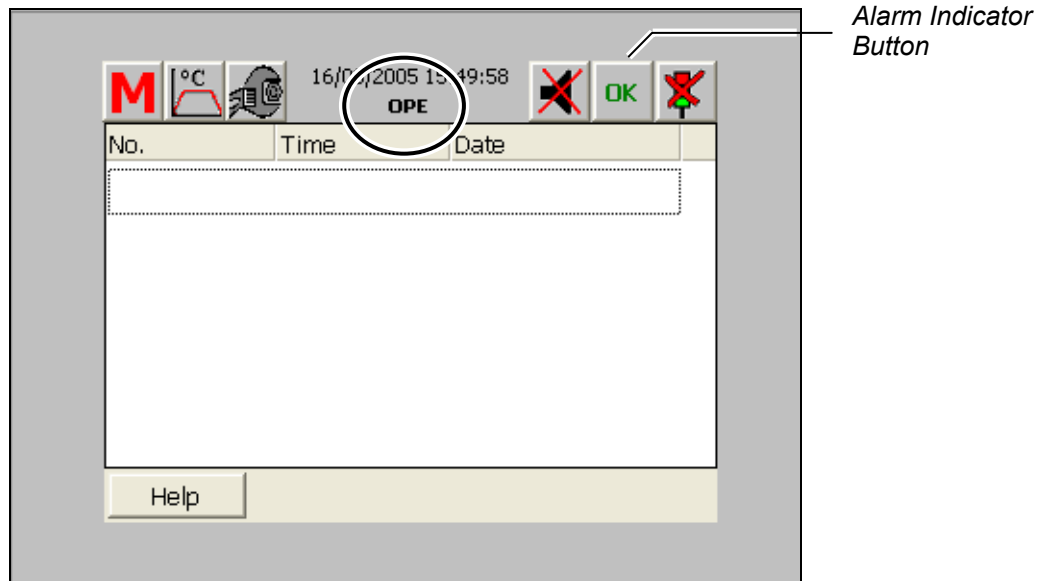


Figure 6-53 Alarm Indicator

6. Return to the Main Menu by clicking on the "M" button.



CAUTION!

It is necessary to reset the date/time each time you shut down the power of the Cure Module. Refer to ["Set Date and Time Procedure"](#).



TIP

Click on the **Help** button for additional tips and helps.



Asymtek Headquarters
2762 Loker Avenue West
Carlsbad, CA 92010-6603 USA
Tel: (760) 431-1919
1-800-ASYMTEK (1-800-279-6835)